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THE FLORA OF PENIKESE ISLAND.

BY PROF. D. S. JORDAN.

I GIVE here a list of the plants found on the Island of Penikese, and in the waters of Buzzard's Bay in the neighborhood of the island, during the late session of the Anderson School of Natural History. This list is probably complete in the flowering plants and measurably so as regards the higher algæ. The lichens, fungi, diatoms, etc., I have not tried to identify and they are therefore omitted.

The island as it now appears is absolutely treeless and nearly shrubless, and it is scantily covered with pasture grasses which furnish subsistence to flocks of sheep. Altogether it is about as barren looking a pile of rock and stone as one could well imagine.

When Penikese was first known it was covered with a growth of trees said to be similar to those now found on Martha's Vineyard and Naushon. Among these may be mentioned the red cedar, pitch pine, red maple, shag bark, shad, poplar birch, hornbeam and two or three species of sumach. Of this growth there is now no trace left save the rotten roots of a solitary beech stump and a few branches of red cedar and red maple (?) found buried in the muck of a small swamp.

This list may have a special interest to future students at Penikese and also a general interest to botanists, as showing which plants survive a prolonged struggle for existence against

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grass and sheep. There are no flowering plants on the island that are at all rare, but some species very common on the mainland are conspicuously absent, for instance the asters and golden rods.

The flora of Gull, a very small island just separated from Penikese, is included. Several plants, as *Lathyrus maritimus* and *Solidago sempervirens*, are found there which are not in the flora of the main island. Probably they once grew there but have become exterminated. Such plants are marked with a star(*).

RANUNCULACEÆ.

Ranunculus cymbalaria Pursh.

CRUCIFERÆ.

Capsella Bursa-pastoris Mönch.
Sisymbrium officinale Scop.
Lepidium Virginicum L.
Brassica nigra Gray.
Brassica sinapistrum Boiss.
Cakile Americana Nutt.
Raphanus Raphanistrum L.

VIOLACEÆ.

Viola sagittata Ait.

HYPERICACEÆ.

Hypericum mutilum L.

CARYOPHYLLACEÆ.

Cerastium viscosum L.
Stellaria media Smith.
Arenaria peploides L.
Spergularia salina Presl.
Spergula arvensis L.
Sagina procumbens L.
Mollugo verticillata L.

PORTULACACEÆ.

Portulaca oleracea L.

MALVACEÆ.

Malva rotundifolia L.

GERANIACEÆ.

Oxalis stricta L.

ANACARDIACEÆ.

Rhus toxicodendron L.*

LEGUMINOSÆ.

Trifolium repens L.
Trifolium procumbens L.
Trifolium arvense L.
Lathyrus maritimus Big.*

ROSACEÆ.

Potentilla argentea L.
Fragaria Virginiana Ehrh.
Fragaria vesca L.
Rubus villosus Ait.

HALORAGEÆ.

Myriophyllum scabratum Mx.

ONAGRACEÆ.

Ludwigia palustris Ell.

UMBELLIFERÆ.

Archangelica Gmelini DC.*

COMPOSITÆ.

Erigeron Canadense L.
Solidago sempervirens L.*

Iva frutescens L.
Ambrosia artemisiæfolia L.
Achillæa millefolium L.
Maruta cotula DC.
Leucanthemum vulgare Lam.
Gnaphalium uliginosum L.
Erechthites hieracifolia Raf.
Xanthium strumarium L.
Cirsium arvense Scop.
Cirsium lanceolatum Scop.
Taraxacum Dens-Leonis Desf.

PRIMULACEÆ.

Anagallis arvensis L.

PLUMBAGINACEÆ.

Statice Limonium L.*

PLANTAGINACEÆ.

Plantago major L.
Plantago lanceolata L.

SCROPHULARIACEÆ.

Linaria Canadense Spr.
Verbascum Thapsus L.

LABIATÆ.

Teucrium Canadense L.
Lycopus Europæus L.
Nepeta cataria L.
Scutellaria galericulata L.
Leonurus cardiaca L.

CONVOLVULACEÆ.

Calystegia sepium R. Br.

SOLANACEÆ.

Solanum nigrum L.
Datura Tatula L.

ASCLEPIADACEÆ.

Asclepias incarnata var. pulchra L.

POLYGONACEÆ.

Polygonum Hydropiper L.
Polygonum Persicaria L.
Polygonum aviculare L.
Polygonum maritimum L.
Rumex obtusifolius L.
Rumex crispus L.
Rumex acetosella L.

CHENOPODIACEÆ.

Chenopodium album L.
Suæda maritima Dumort.
Salsola kali L.
Salicornia herbacea L.
Atriplex patula L.
Atriplex arenaria Nutt.

AMARANTACEÆ.

Amarantus retroflexus L.

EUPHORBIACEÆ.

Euphorbia maculata L.
Euphorbia polygonifolia L.

SALICACEÆ.

Salix discolor Muhl.

BETULACEÆ.

Betula alba var. populifolia Spach.

NAIADACEÆ.

Zostera marina L.
Ruppia maritima L.

IRIDACEÆ.

Iris versicolor L.
Sisyrinchium Bermudiana L.

JUNCACEÆ.

Juncus Gerardi Loisel.
Juncus pelocarpus Meyer.

Juncus tenuis Willd.

CYPERACEÆ.

Cyperus filiculmis Vahl.
Eleocharis palustris R.Br.
Eleocharis acicularis R.Br.
Scirpus pungens Vahl.
Scirpus maritimus L.
Carex scoparia Schk.
Carex straminea Schk.

GRAMINEÆ.

Agrostis alba L.
Agrostis vulgaris With.
Phleum pratense L.
Setaria viridis Beauv.
Setaria glauca Beauv.
Anthoxanthum odoratum L.
Festuca ovina L.
Festuca elatior L.
Poa annua L.
Poa pratensis L.
Poa serotina Ehrh.
Glyceria maritima Wahl.
Spartina juncea Willd.
Spartina stricta Roth.
Calamagrostis arenaria Roth.
Triticum repens L.
Holcus lanatus L.
Panicum sanguinale L.
Panicum dichotomum L.
Panicum crus-Galli L.
Elymus Virginicus L.*

FILICES.

Dicksonia punctilobula Kunze.

MUSCI.

Polytrichum commune.
Ornithotrichium (undetermined).
Undetermined.

MELANOSPERMEÆ (Olive-green Algæ).

Sargassum vulgare Agardh.
Sargassum Montaguei Bailey.
Fucus nodosus L.
Fucus vesiculosus L.
Desmarestia viridis Lam.
Laminaria saccharina Lam.
Laminaria digitata Lam.
Laminaria ascia Ag.
Laminaria longicornis Pylaie.
Dictyosiphon fœniculaceus Grev.
Punctaria tenuissima Grev.
Asperococcus echinatus Grev.
Chordaria flagelliformis Ag.
Chordaria divaricata Ag.
Lathesia tuberiformis Gray.
Elachista fucicola Fries.
Sphacelaria cirrhosa Ag.
Ectocarpus littoralis Lyngbye.
Ectocarpus siliculosus Lyngb.

RHODOSPERMEÆ (Red Algæ).

Rhodomela subfusca Ag.
Polysiphonia formosa Sahr.
Polysiphonia subtilissima Mont.
Polysiphonia Olneyi Harv.
Polysiphonia Harveyi.
Polysiphonia elongata Grev.
Polysiphonia violacea Grev.
Polysiphonia variegata Ag.
Polysiphonia nigrescens Grev.
Polysiphonia affinis.
Polysiphonia fastigiata Grev.
Dasya elegans Ag.
Champia parvula Harvey.
Corallina officinalis L.
Nullipora polyphyllamea?
Grinnellia Americana Harv.
Delesseria sinuosa Lam.
Gelidium corneum Lam.
Polyides rotundus Grev.
Rhodymenia palmata Grev.
Furcellaria fastigiata?
Phyllophora Brodiæi Ag.
Ahnfeltia plicata Fries.
Cystoclonium purpurascens Kützing.
Chondrus crispus Lyngb.
Spyridia filamentosa Harv.
var. refracta Harv.
Ceramium rubrum Ag.
Ceramium diaphanum Roth.
Ceramium fastigiatum Harv.
Ceramium arachnoideum Ag.
Ptilota elegans Bonnemaison.
Griffithsia corallina Ag.
Callithamnion Baileyi Harv.
Callithamnion Borreri Ag.
Callithamnion byssoideum Arn.
Callithamnion corymbosum Ag.
Callithamnion seirospermum Griff.
Callithamnion plumula Lyngb. (rare).
Callithamnion Americanum Harv.

Callithamnion Turneri Ag.
Callithamnion Daviesii Ag.
Callithamnion luxurians Ag.

CHLOROSPERMEÆ (Grass-green Algæ).

Bryopsis plumosa Lam.
Vaucheria (species not described by Harvey, allied to V. Murina).
Porphyra vulgaris Ag.
Bangia fuscopurpurea Lyngb.
Enteromorpha intestinalis Linb.
Enteromorpha Hopkirkii M'Calla.
Enteromorpha compressa Grev.
Enteromorpha clathrata Grev.
Ulva latissima L.
Cladophora arcta Dillw.
Cladophora lanosa Roth.
Cladophora glaucescens Griff.
Cladophora flexuosa Griff.
Cladophora albida Huds.
Cladophora gracilis Griff.
Cladophora fracta Fl. Danica.
Chætomorpha melagonium Web. and Michr.
Chætomorpha ærea Dillw.
Chætomorpha Olneyi Harvey.
Hormotrichum Younganum Dillw.
Calothrix confervicola. —
Calothrix scopulorum. —

ON LOCAL VARIATIONS IN THE NOTES AND NESTING HABITS OF BIRDS.

BY ROBERT RIDGWAY.

MR. ALLEN has called attention to the variation in the notes of different birds at remote localities; and in this I am able to corroborate him, though I think that cases of such variation are very rare, and do not occur in more than perhaps five per cent. of the species. I have only detected it in two or three species after the most careful observation, and in very many cases noticed that there was not, in the minutest particular, any difference between individuals of one species on opposite sides of the continent. Such is undoubtedly the case in a very great majority of the species, any seeming variation that may be observed being more probably the peculiarity of an individual rather than the manifestation of any regional impress. The only instances wherein I have yet been able to satisfy myself of a difference in notes in two regions are the following; *Cardinalis Virginianus* has a far finer song in southern Illinois than it has in Maryland, the notes being not only clearer and more musical, but the song more continued and energetic; the effect being altogether richer. In the vicinity of Washington, D. C., I have never heard, in a single instance, the Baltimore oriole (*Icterus Baltimore*) utter such mellow, flute-like notes, as it habitually does in southern Illinois. The

brown thrasher (*Harporhynchus rufus*) also sings more vigorously in the latter locality. In the far west I found the ground robins of the Wahsatch Mountains (*Pipilo "megalonyx"*) to have such different notes from those of the eastern slope of the Sierra Nevada (in the neighborhood of Carson City) that it seemed that they must certainly be a different species; not only did the song differ, but all the notes were different. Yet upon the closest comparison of the specimens, no tangible differences in plumage or proportions could be detected in the majority of the specimens from the two localities, though occasional individuals from the latter place inclined, more or less, toward the form known as *P. Oregonus*.

The exact nature of the difference in notes between certain birds in the Potomac valley, and the valley of the lower Wabash, is a very marked *restraint* in the songs of the former, *as if they were afraid of being heard*. That they were more cautious in the neighborhood of noisy cities, than in the country surrounding quiet and less populous towns, might be readily suggested as the solution of this difference, were it not for the fact that other species, as, for instance, the robin (*Turdus migratorius*), the meadow lark (*Sturnella magna*), the catbird (*Galeoscoptes Carolinensis*), the *Thryothorus Ludovicianus* and numerous other species, sing as boldly and in a precisely similar way among the parks and shade trees in the midst of Washington City as they do in the quiet towns and retired orchards of southern Illinois. This objection may lose weight, however, when we consider that the species in which I have noticed a difference are birds of a suspicious and cautious nature, such as would be most readily influenced by the causes mentioned.

Mr. Allen has called attention* to variations in the mode of nesting, which he has noticed in many species of birds; and places undue importance upon it in considering certain deviations from the usual manner as characteristic of particular localities. My experience has been that such variations depend mainly upon the facilities afforded by the site of the location of the nest, and sometimes, no doubt, are the result of merely the caprice of the bird. The *Quiscalus purpureus* is cited as one example, and considerable stress is laid upon the fact of its placing the nest in cavities of trees in a certain locality in New England. At Mt.

*See AMERICAN NATURALIST, vol. vi, p. 263.

Carmel, Illinois, where this species is very abundant, I have found its nests situated in a variety of ways upon one tree; some being saddled upon the branches, or supported in a crotch like those of the robin, and others placed in cavities, either natural ones such as knotholes or decayed places, or in the holes made by the larger woodpeckers (*Hylotomus* and *Colaptes*). I once found a very large colony of these birds breeding upon a small island in the Wabash River. The nests were all placed in the tall slender willows, none more than twenty feet from the ground, and many within easy reach without climbing; they were supported by small twigs *against the body of the saplings*, for there were no large limbs to support them. Probably more than a hundred pairs were nesting in this community, as upwards of seventy nests were found in a short time. Within the area of a square mile, I have found nests of the common dove (*Zenaidura Carolinensis*) upon trees, on the top of stumps in the thick woods, on the flat rail of a fence, and upon the ground in grain fields; also nests of *Harporhynchus rufus* in as diverse situations. Near Mt. Carmel the white-bellied swallow (*Tachycineta bicolor*) nests exclusively in holes made by the downy woodpecker (*Picus pubescens*) and chickadee (*Parus Carolinensis*), in the dead stumps around lagoons in the bottom lands, in company with the golden swamp warbler (*Protonotaria citrea*), with which it shares these cavities. At Carson City, Nevada, this species was noticed to nest only about houses, in the eaves or over porches, as the purple martin (*Progne subis*) does in the east. There were no trees there to accommodate them, which accounted for this deviation from their original habit. At Mt. Carmel, the purple martin and chimney swift (*Chætura pelagica*) have almost entirely forsaken these nesting places, and have taken up with man, the former being as domestic as house pigeons, and the latter possessing themselves of the chimneys. But the white-bellied swallow pertinaciously clings to its primitive custom. In California, according to various writers, and in Arizona according to Dr. Coues, the *T. thalassina* nests in holes in trees, but during two years of collecting in Nevada and Utah I never saw a nest of this species so situated; it constantly nested in horizontal fissures or crevices on the face of the limestone cliffs, in company with the "mud swallow" (*Petrochelidon lunifrons*) and white throated swift (*Panyptila melanoleuca*). This was apparently not owing to a lack of suitable places for nesting

as it does in California and Arizona, for in the same localities were extensive aspen woods where *T. bicolor* and *P. subis* nested abundantly in holes made by the *Sphyrapicus nuchalis*. The inference drawn from this fact is, that it has a natural preference to rocks as a nesting place, always ignores the trees where suitable rocks are to be found; and that its nesting in trees in districts where precipices are rare or wanting is merely an evidence that it, like other species, adapts its habits to the character of the locality. The red-fronted linnet (*Carpodacus frontalis*) nests about houses in California; choosing nooks and crannies about the buildings, as well as the shade trees, for nesting places. At Sacramento I found a nest of this species built inside the pendulous, basket-like structure of the oriole (*Icterus Bullocki*). Along the Truckee River, in Nevada, another was found inside the mud nest of a cliff swallow (*P. lunifrons*); around Pyramid Lake the species nested among the rocks, frequently in caves with the *Sayornis Sayus* and *Hirundo horreorum;* while in the wooded portions of the Truckee valley its nests were common in the "grease wood" (*Obione*) bushes, along with those of *Spizella Breweri* and *Poöspiza bilineata*, as well as in the cottonwood trees near by. It would require too much space to describe all the different situations in which I have found the nests of *Troglodytes Parkmanni*, so that I will only mention some of the more remarkable instances of variation. In the Wahsatch Mountains, as well as in the Truckee valley, it was usual for the nests to be concealed behind the loose bark of a dead tree, the entrance being through a fissure in the bark at one side of the nest; probably eight out of every ten nests would be so situated. Many, however, were found inside of cavities, either natural or made by woodpeckers, while one was found built inside of a deserted robin's nest in the crotch of an aspen.

On the Truckee reservation one was found in the thatched roof of the storehouse. Everywhere, throughout the mountain of the great basin, the sparrow hawk (*Tinnunculus sparverius*) nests on the cliffs, in holes among the rocks, in company with the *Falco polyagrus*. At Mt. Carmel, I have found nests of *Colaptes auratus* in natural cavities in trees, and a nest of *Centurus Carolinus* in a low stump by the roadside, about three feet from the ground. At the same place, *Parus Carolinensis* bores its own nesting place in the soft wood of wild plum and sassafras trees, and frequently

takes possession of natural hollows in stumps, uprooted "snags," or the deserted excavation of the downy woodpecker. I found a nest of the chimney swallow inside of a plank kiln for drying tobacco, and another inside of the hollow trunk of a sycamore tree. At Olney, I found a nest of the blue jay, containing five eggs, inside of an old deserted barn in the middle of the town, it being placed flat upon a sill. This is the only nest of the species I ever saw that was not placed in a tree. At Mt. Carmel, I have also found a nest of *Agelaius phœniceus*, containing eggs, in a small elm tree about twenty feet from the ground. In Kansas the *Euspiza Americana* is said to place its nest in trees; but at Mt. Carmel it habitually places it on the ground in clover fields. The *Chondestes grammaca* almost invariably nests on the ground in the Wabash valley. I have never found a nest otherwise located; but at Sacramento, where dozens of nests of this bird were found, all but one were in oak trees, at heights varying from ten to thirty feet from the ground. It is difficult to understand why the species should be so much more arboreal in the vicinity of Sacramento, which is far more scantily wooded than the localities frequented by this bird in Wabash valley. An instance of semi-parasitic habits is seen in the *Otus Wilsonianus*, which in Nevada habitually deposits its eggs in the old dilapidated nests of magpies.

During a series of several seasons' egg-collecting at Mt. Carmel, it was my constant experience to find several species of birds never laying more than three eggs at a complement; and the recorded accounts of these species in various works saying that the same birds laid habitually four or five eggs puzzled me considerably. Three eggs in a nest is the maximum number that I have ever found in *Pyranga æstiva* and *Cardinalis Virginianus*.

A NEW SPECIES OF WILLOW FROM CALIFORNIA, AND NOTES ON SOME OTHER NORTH AMERICAN SPECIES.

BY M. S. BEBB.

SALIX LÆVIGATA, n. sp. Very glabrous, except the scales and rachis of the catkin, and a few small caducous silky leaves at the base of the shoots; leaves elliptic-ovate or broadly lanceolate, pointed, finely serrulate, but the margin revolute and thus appearing entire, coriaceous, dark bluish green, glossy and prominently nerved above, paler beneath; stipules small, ovate, caducous; petioles short (1″–4″ long) not glandular; catkins cylindrical, 2 or 3 inches long in flower, the fertile becoming loose in fruit, always borne on short lateral leafy branches; scales erose-dentate at the apex, distinctly nerved, hairy at the base and on the inner surface; ♂ obovate, rounded and more evenly dentate, ♀ narrower, truncate with a few irregular teeth, caducous (in outline, when magnified, like the leaves of *Potentilla tridentata*); ovary globose-conical, smooth, long stalked (as in *S. amygdaloides*); stigmas sessile, 2-lobed; stamens 3–5.—California, at Santa Cruz, Dr. C. L. Andersson, to whom I am indebted for a very interesting collection of California Salices. Ukiah, Kellogg and Harford, No. 921. Alameda Co., Bolander, in herb. A. Gray.

A remarkable species of the Amygdalinæ group, distinguishable from all forms of *S. nigra* Marsh. (the only near ally in the U. S.) by the conspicuous dentate scale, and very different foliage. *S. lasiandra* Benth., a western modification of *S. lucida*, has an obscurely dentate scale, but is otherwise very unlike. As the buds expand, two or three small scale-like leaves appear clothed beneath and fringed on the margin with ferruginous silky hairs; these soon fall off; the lowest persistent leaves on the branches are obovate, obtuse with an abrupt point, almost sessile; these are followed by others broader, more pointed, on short petioles, passing into the lanceolate taper-pointed form of the fully developed foliage.

S. PYRIFOLIA Andersson. This elegant species, recorded by Andersson from the Lake Winnipeg and Saskatchewan region,

was sent me by the Rev. Jas. Fowler from New Brunswick, and from within our own limits by Dr. Clarke from Flint, Mich.; two widely sundered stations on our northern boundary, suggesting the possible occurrence of intermediate ones. The only additional specimens in Prof. Gray's herbarium are two ♂ fragments named by Andersson, enough to confirm the correctness of the above determination. The typical form has round, sub-cordate, very thin, reticulate veined leaves, slender petioles, small caducous stipules, foliaceous peduncles, and very long and slender pedicels. The var. *obscura* (apparently a more vigorous growth of the same plant?) would be likely to escape observation from its general resemblance to some forms of *S. cordata*.

S. ADENOPHYLLA Hook. This is another and most interesting addition to our willows of the Northern States. Its occurrence on sandy beaches of the Great Lakes I have already noticed in "The Lens."

S. CUTLERI Tuck. If Dr. Andersson's var. *Labradorica* (DC. Prodr. xvi, p. 292) is rightly associated with our White Mountain plant, then the old name of *Uva-Ursi* Pursh ought to be restored for the Labrador plant, and ours become its var. *Cutleri*.

Col. S. T. Olney observes that *S. tristis* Ait. flowers "fully a fortnight later than *S. humilis*." This is noteworthy, as *S. tristis* affects warm, sunny knolls, and would therefore be expected to flower *earlier* instead of later than its more robust congener, *S. tristis* var. *microphylla*. For all I know this variety rests upon a single gathering, distributed by Mr. Oakes many years ago; probably a *forma monstrosa*. I had in my garden last summer precisely the same "rigid and contorted" leaves produced on *S. viminalis* by insects infesting the under surface, but have looked in vain over acres of *S. tristis* for specimens to match those of Mr. Oakes.

THE ROBIN.

BY CAROLINE BOYCE.

THE American robin (*Turdus migratorius*) is too well known to every resident of the United States, to require any extended description, and yet, I am often surprised at the ignorance of

farmers and countrymen in general, as to his character and habits. They shoot and stone, and destroy and berate, but never praise him; still he perseveres, in the very teeth of an adverse fate, and comes regularly with the spring months, appearing sometimes, in clement seasons, in eastern New York, in February, and remaining oftentimes when the fall is favorable until late in November, and instances have been known when a straggler separated from the main flock has remained, and survived the severity of a winter in latitude 42° north, in a locality where evergreens were prevalent. The robin can accommodate himself to a variety of food, and during the summer season is the farmer's best friend. He is hardy and robust and brave, one of our valuable, but most badly abused birds. His food is mainly insectivorous, from the time he comes amongst us until late in the autumn. He makes occasional visits to the cherry tree but does not depend on it for a subsistence as he is supposed to do. He pecks at the cherries because they are red, just as he would pick to pieces a red flower. The species appears fond of the color. In the fall they feed largely on wild berries, and are slaughtered by the thousands by sportsmen along the lines of the Hudson, in the cedar thickets, which they frequent, feeding on the berries, on the islands in the harbor of New York Bay, and in New Jersey. I am too much the friend of this bird to be blind to his petty faults, for petty indeed they must remain so long as his increase is kept in rigid restriction by his many enemies. The crow (*Corvus Americanus*) commits fearful and cruel depredations on the robin and his belongings. The species is a bitter foe to all smaller birds, and keeps them in severe check, but the robin suffers numerous outrages from other hands, and the elements sometimes play him a mischievous trick. Not only the crow, but the crow blackbird (*Quiscalus versicolor*) and the cuckoo (*Coccygus Americanus*) often rob the nest after the eggs are laid, and thus all the female's labor proves in vain. The robin will steal into the nest of one of her own kind, during a temporary absence of the owner, when she had thus been robbed, and appropriate it as her own, depositing a remaining egg of her clutch, or mayhap more and, if plucky, will drive off the legal owner, and taking bold possession, bestow all her care thereon, but she never disturbs the rights of other birds. Occasionally she only drops an egg into a sister's nest when taken short, her own being destroyed,

but the act is never deliberate or voluntary, a habit that is never practised among the species except in extreme cases of necessity, for regular bird life has its laws that are observed, and crimes and persecutions are often punished. The nest, which is an extravagant, clumsy affair, extravagant as to material employed, is patted up by the feet at the fork of limbs, and is moulded in the inside by the breast, the bird turning round and round many times with the tail hugged down close on the outer rim, the female performing all the labor. The male takes no part in this structure, but is stationed near as a guard, and gives the alarm if danger portends, while the *mater en famille* is absent in quest of material. If all be quiet and serene, a snatch of song may greet the listening ear, but it is hurried, for the male is deeply interested in operations, and feels a heavy responsibility resting on his shoulders. When the female is descried with a supply in her beak, he immediately flies to meet and accompany her. The two alight near and survey the premises when, if all be right, the labor goes on vigorously. This work occupies them three or four days, sometimes a shorter period, according to the urging necessity of nature that the bird feels. The eggs are deposited daily, until the number is dropped. The robin on an average lays four eggs, but I have seen five eggs, followed by five birds in one nest, all one mother's progeny, but there are oftener three. Two appears to be the lucky number for the robin, and they usually go mated from the nest. A robin lodged her nest in a small tree near my dwelling last year in the after part of May, and reared three young. When they were able to leave the nest, another was built a little farther off in the fork of a young pear tree, not more than five feet from the ground. In this nest was brought up, right under the loaded boughs of a cherry tree, two fine birds, a male and a female, and all my sedulous watching never caught them in the guilty act of carrying cherries to the nest. The birds had become accustomed to me, and familiar, and never appeared to stand in fear of my scrutinizing presence, although they eyed my movements as closely as I viewed theirs; but I always observed a formal distance, and held in respect their individual rights: thus was I tolerated without giving disturbance. The robin rears but two broods in one season. After the first brood leaves the nest, in a day or two, they are turned over entirely to the charge of the male, who feeds, protects, and keeps

in close proximity, while the female is occupied with preparations for a second family. The second nest is not very far removed from the first, and fortunate indeed must the parents be if these two broods all grow to be adult birds. If the male gives no assistance in building the nest, yet he has his duties to perform which become him marvellously. As soon as the birds are out of the shell it is his business to clear out the nest of all offensive matter, and keep it clean of all excrement until the birds have flown, provide all the food, which is purely insectivorous, and sit upon the nest in the female's absence, which is no small ignoble office for so brave and noble a fellow as cock robin. He finds but little time now for his loud, long strains. His part of duty will not bear neglect.

The young, when left undisturbed, seldom go far away from the home nest, although when they once leave, they never enter it again. It is left in an uncleanly state, generally alive with vermin, which soon leave the young bird. The robin is remarkably clean in every habit, and takes a daily bath. I was much amused one day, the past summer, at a little incident that occurred in the front yard under the cherry tree.

A female robin was gathering materials for a second nest, picking from around the roots of rose bushes, the long dead grasses, until her beak was filled and the ends flowed out like silken hairs, when suddenly one of her own young ones, a pretty mottled little creature, alighted in front of her and, opening wide her yellow throat, begged for food. The mother thus taken without warning was confused, and administered a gentle peck on the head as a reproof, which did not have the desired effect, so she immediately plunged the whole contents of her beak down the little one's throat and flew away. The poor little thing had a long and difficult tug, in clearing its throat of the unstable commodity, but the repentant parent soon returned with wholesome food, and gave her offspring, after which the male appeared, and piloted off the offending charge to an adjoining tree. No doubt mine frau gave her liege lord a severe curtain lecture, upon the occasion. Secrets of bird-life are seldom revealed but to the understanding few. Has any one ever observed the manner in which a bird approaches its object, how cautiously, politely, quietly, it proceeds moving with one eye ever on the alert for danger, and the other solicitously bent on the particular thing of its desire? How it

advances, then recedes, then bows and courtesies with all the suavity of a Frenchman, and peers inquiringly, stooping down low, placing its nimble little body in a thousand graceful positions, as it slowly, steadily and discreetly approaches its object of concern?

If I should venture to say that not a cherry would grow, fit to be eaten, were it not for the birds, the bare idea would be hooted as preposterous, yet such nevertheless is my belief. Were it possible to remove all the birds out of the way, for one season at least, what a decided difference would our future orchards present! Where now are thrifty growths, beautiful leafage, and large crops of fair fruit, would be seen stinted, moss-grown limbs with sparse or meagre foliage, crops of dwarfed specimens, that have finished their growing, in a knotty, wormy, inferior state. The majority of all the large families of insects are bred in the earth, and go through various forms in different stages of existence and are devoured by birds of every description, chief among which stands our friend, the robin.

The robin sits eleven days. On the eleventh the young are out of the shell, and on the eighth their eyes are wide open and bodies covered with pin feathers. In eleven days more they leave the nest on an average, although when the nest be not crowded they remain two days longer. Upon close observation the plumage of the adult robin is tame, but rich and mellow, with soft colorings. The top of the head is dappled in brown and black, with delicate markings and pencillings at the throat where it meets the cinnamon breast in the male. The female is lighter in color and has no rosy tinge to the neck feathers. There is but a slight difference in the size of the male and female, but the general shape and build of the birds is marked so perceptibly that a practised eye can readily distinguish between the two. In general appearance the female is the larger bird, but the male is stronger, closer and altogether more powerful in limb. The large bright eyes in both sexes are set in a ring of white. As a songster, the robin does not rank high, yet there are some rare singers among the species. A singer has a long, slender body, a long neck, long tail, dark, rich plumage, soft like satin. He is a fine bred bird. All are not first class singers. Nature does not appear to endow all with her rare gift. Where there is one that is a singer there are scores that are only mediocre. The robin's note is peculiarly mellow and flute

like, sometimes a little irregular and extravagant, but, when followed closely, through all its various changes, vibrations and intonations, is found to possess a striking sweetness and freshness, seldom excelled and rarely equalled, if we except the beautiful strain of the hermit thrush. He gives to his lower notes a quiet dash of subdued sadness, and then immediately swells them to upward bars of wondrous perfection and beauty. He has a set of notes in an under key that are seldom heard by the unobservant ear, and if heard are attributed to another bird. He gives a clear, quick, military call and has a piercing cry of distress. The notes about the nest are all suppressed and low, but yet clear and distinct. They are uttered by the female and are the language of the mother to her offspring. She has no distinct song.

RAMBLES OF A BOTANIST IN WYOMING TERRITORY.

BY REV. E. L. GREENE.

NO. II.

With the month of July, the varied profusion of flowers begins to be greatly reduced on the high plains, whose rich spring flora was briefly sketched in the last number.

On the third of this month we stood upon the summit of a ridge commanding a view of many surrounding miles of these treeless lands. The grasses, under the constant sun and the now advancing drought, were already losing their freshness of color, and becoming cured, uncut, into hay for the antelope and the domestic herd, to feed them during the next eight months. There is yet one very showy flowering plant, which has so far resisted the drought, and is now giving to even hundreds of acres of ground the very azure of the sky above — a sea of blue. The plant is *Delphinium azureum* Michx., a perennial species of larkspur. In the month of April the root-leaves make their appearance, and as they furnish then the only sort of green herbage that has been seen for many months, herdsmen are obliged to exercise all diligence to keep cattle away from the tracts which this plant occupies. The

leaves when eaten cause speedy death, and so this great beauty of the plains is known to the settlers by the name of "poison weed."

On the stony ridge, our point of observation, there was not much left at this season to interest us, save the fruits of the Astragali and other remains of the flowers of spring. A little daisy-like composite, with white rays, quite stemless and altogether unnoticeable but for the comparatively large size of its flowers, was new to us then, and a good acquisition, proving to be Nuttall's *Townsendia strigosa*. Another tenant of this same series of hills now in flower is *Eritrichium glomeratum* DC., a coarse hairy biennial a foot high, belonging to the natural order Borraginaceæ. Along the dry margin of what had been a pond at an earlier date, we found an abundance of a very small Gilia (*G. minima* Gray) which, as we have never seen it anywhere else, in all the region, must be accounted as rare in these parts, as it is minute and interesting. *Gilia congesta* Hook., a handsome species, is now to be found in a good state for collecting, growing in the gravel beds along Crow Creek, at Cheyenne, and with it the splendid blue-flowered *Pentstemon glaber* Pursh.

The railway station, Sherman, some thirty or thirty-five miles west from Cheyenne, has an altitude of about two thousand feet above that of Cheyenne, and the flora of that vicinity is still more interesting than that of the region we have just been noticing, especially at this season of the year. It was on the 3d of July that we had a delightful ramble among the rocky "Black Hills," in this part of the Territory. Although this district does not suffer from drought as do the lower altitudes, yet timber appears always to have been scarce. One can see that whatever was available for the purposes of fuel and ties for the railway has long since been appropriated, and there now remain only a few scattered pines (*Pinus ponderosa* Dougl.) on the hills, and some little groves of aspen (*Populus tremuloides* Mx.) in the moist valleys. There are straggling bushes of "wild sage" (*Artemisia tridentata* Nutt.) growing on all the hilly portions of the land, and with it we found the more interesting *Purshia tridentata* DC., a rosaceous shrub, with inconspicuous flowers, easily mistaken for sage brush itself. *Salix rostrata* Rich., *S. glauca* L., and one or two other species of willow, were noticed in some boggy places, their leaves in the early morning drooping and distorted, as were

also those of the herbaceous plants, with the severity of the night's frost, even in early July.

On dry open grounds we found an abundance of *Castilleia parviflora* Bong., a fine scarlet-flowered species peculiar to the far west, and with it a more strictly alpine, and a yellow-flowered one, *C. breviflora* Gray. These two, together with plenty of that most handsome Pentstemon, *P. acuminatus* Dougl., were enough to convert even the otherwise barren hillsides into a paradise of beauty. Among the grasses and sedges of the marshy places, were quantities of a large "buttercup," an unusually showy form of *Ranunculus affinis* R. Br.; and also an Allium, species uncertain, for we indulged a natural dislike for the whole tribe of leeks, and passed by these really handsome purple-flowered ones without taking one specimen for our herbarium. A fine "monkshood" (*Aconitum nasutum* Fisch.), its flowers in most cases dark purple, but in other specimens yellowish-white, was also very conspicuous in wet shades; and in the edges of these wet places, grew *Hedysarum boreale* Nutt. and *Astragalus alpinus* L.; both interesting leguminous plants not often met with.

One crystal brooklet had its margins adorned with the large yellow purple-dotted corollas of *Mimulus luteus* L., while the damp ground near by was neatly carpeted with *Veronica serpyllifolia* L. These two elegant Scrophulariaceæ, one belonging eastward and the other more exclusively to the distant west, have met here on common ground; and with them was a very diffuse Androsace, with pale foliage, the species doubtful.

Out again upon higher and drier land we suddenly came upon quite an unexpected rarity in *Ranunculus Nuttallii* Gray. We had found it twice in Colorado, in shaded ravines, in the original slender form: but this Wyoming plant has far more numerous and more showy flowers than before seen. It is quite abundant, too, in this new locality. Here was an abundance also of *Eriogonum umbellatum* Torr., with that cream-colored shade of flowers usually met with in this plant at higher altitudes. They are always of a deep, rather greenish yellow in the less elevated localities. Under the shade of some high and massive piles of rock, which constitute an interesting feature of the landscape at this place, we found for the first time, in all our Rocky Mountain rambles, the splendid *Polemonium confertum* Gray. It was the larger variety,

and all the flowers pure white. This alone, we then thought well worth our thirty miles' journey on horseback; but a few weeks later, the discoverer of the plant conducted us to one of his original localities of it, near the summit of Parry's Peak in Colorado.

At the margin of a shallow pond, walled in on one side by rocks, and hidden on the other by a growth of aspens, we frightened, from his herborizing among the sedges, a fine black-tailed deer and gathered for ourselves some large specimens of the brilliant *Pedicularis Grœnlandica* Retz, and the large silvery leaves of the rare *Nardosmia sagittata* Hook. But the day was now past the meridian, and we were obliged to take leave of this interesting ground, in order to reach Cheyenne at a reasonable hour of the evening, gathering by the way, upon the lower plains, the vespertine Mentzelias and Œnotheras, which unfold their petals towards sunset, and breathe fragrance upon the air of night.

BOTANICAL OBSERVATIONS IN WESTERN WYOMING.

BY DR. C. C. PARRY.

NO. IV.—APPENDIX; DESCRIPTIONS OF NEW SPECIES, ETC.

THE numbers are those affixed to the tickets in the distributed collection, and referred to in the preceding articles. The characters or descriptions which follow are by the botanists respectively whose names are appended to their several contributions, — in which the collector, having been summoned to a remote frontier, is able to take only a small part.

3. AQUILEGIA JONESII.—Acaulescent, minutely soft-pubescent; leaves all crowded, and the persistent scale-like dilated bases of their petioles imbricated on the stout ascending branches of the rootstock, biternately divided; the primary divisions with very short if any partial petioles, and the secondary ones sessile or confluent at base, so that the nine small and obovate entire leaflets or divisions are in a dense cluster; scape from one to at length three inches high, naked, exceeding the leaves, one-flowered. sepals and petals blue; the former oblong, exceeding the gradually tapering straightish spurs; styles long, exserted; pods turgid, reticulated, smooth.—In crevices of loose arenaceous limestone, on the summit of Phlox Mountain, forming close clusters. A remarkable and most distinct, very dwarf species, collected July 18, mostly out of flower, and with full-grown fruit; but a few blossoms were secured. The species is dedicated to Capt. W. A. Jones, U. S. Engineer, who first detected this interesting species, and to whose efficient aid as Commander of the expedition the botanical collection is largely indebted for its most valuable results.—C. C. PARRY.

13. STANLEY ATOMENTOSA.—Very stout, white-villous or hirsute throughout (especially the foliage and lower part of the stem); radical and lower leaves lyrate-pinnatifid in the manner of *S. pinnatifida*, the upper ones entire and hastate, passing into lanceolate and finally into subulate bracts for the lower flowers; raceme very dense and thick, cylindrical (becoming a foot or a foot and a half long), of almost innumerable pale cream-colored flowers; pedicels in fruit about the length of the filiform stipe.—Owl Creek on dry slopes in gypseous soil. Biennial, perhaps sometimes perennial by offshoots, one to three feet high. Petals lanceolate, oblong, narrowest in the centre. Stigma green.—C. C. PARRY.

DRABA VENTOSA.—Depressed and cæspitose, branching from slender rootstocks, canescently tomentose throughout, the pubescence stellate; leaves crowded on the mostly tufted branches, spatulate oblong or obovate, entire, not rigid; peduncle in fruit exserted beyond the leaves, corymbosely 3-5-flowered; petals golden yellow; silicle oval or orbicular, tomentulose-hirsute, tipped with a short distinct style.—On a high rocky peak overlooking Snake and Wind River valleys. The larger and laxer leafy shoots are an inch and a half or more in height; the denser shorter and in a close tuft. Leaves 3 to 5 or even 6 lines long, of soft and herbaceous texture, obtuse and pointless, tapering to the base; the pubescence wholly soft and stellate, the stellular tuft generally slender-stipitate. Scape or peduncle half an inch to nearly an inch in length when fully developed. Petals obovate or spatulate, 2 lines long. Silicle fully 2 lines wide, 2¼ to 3¼ lines long; the abrupt style half a line to nearly a line long. The foliage is not unlike that of the imperfectly known *D. eurycarpa* Gray, of the Sierra Nevada.—A. GRAY.

65. ASTRAGALUS (ONOBRYCHOIDES) VENTORUM Gray MS.—Somewhat canescent with short appressed hairs; the stems from a subterranean perennial rootstock, erect, 4-6 inches high, flexuous, simple; stipules large and scarious, free from the petiole, united and amplexicaul; leaflets 4-8 pairs, broadly obovate, 4-6 lines long, rounded or retuse at the apex; racemes loose, short peduncled, equalling the leaves; flowers 5-6 lines long, light yellow, the tubular-campanulate calyx 3 lines long, with short setaceously tipped teeth; legume sessile, slightly pubescent, turgid, oblong, 6-9 lines long, slightly curved, completely 2-celled, the ventral suture somewhat prominent and the dorsal slightly impressed.—Collected on Wind River; differing from the other species of the section in its habit, which is that of *A. succumbens*, in its yellowish flowers and larger legumes.—S. WATSON.

75*a*. ASTRAGALUS (PECTINATI) GRAYI Parry MS.—Distinguished from *A. pectinatus* by the broader leaflets, which are 1-1½ inches long by 1½-2½ lines broad, quite strongly veined, and by the somewhat thinner pod, ascending instead of deflexed. The flowers are "light yellow."—On the gravelly ridges bordering Owl Creek valley.—S. WATSON.

126. ASTER (ORTHOMERIS) PARRYI.—A span high, hoary, with a thin loose tomentum; stems several from a rather woody rootstock, simple, the naked peduncle-like summit bearing a single large head; leaves spatulate, cuspidate; scales of the involucre in two series, oblong-lanceolate, very much acuminate, cinereous-pubescent; rays numerous, white, over half an inch in length; akenes very white-villous.—A. GRAY.

144. TOWNSENDIA PARRYI.—Perennial, canescently pubescent; the caudex very short; leaves rosulate, obovate-spatulate, often apiculate, tapering into a petiole of about an inch in length; peduncles stout (2–4 inches long), solitary or several, somewhat leaf-bearing below, naked above and bearing single large heads; scales of the involucre in 3 or 4 series, lanceolate, acute, herbaceous, with scarious lacerate-ciliate margins, the inner ones acuminate; rays bright blue, double the length of the involucre; pappus the same in rays and disk, persistent, of stout and unequal barbellate bristles, a little longer than the akenes.—In the Wind River Range at 9,000 feet alt. (referred to as *T. scapigera* on p. 13). This very beautiful daisy is closely related to *T. scapigera*, and has much the same foliage and a similar pappus and achenium, but the heads are fully as large as those of *T. grandiflora* (1¾ to 2 inches broad), are supported on very stout stalks, and have the rays bright blue. The involucral scales are more pointed than in *T. scapigera*, and the leaves are usually apiculated, as they are not in the latter.

With very fine specimens of the above, Dr. Parry has also collected *T. spathulata* Nutt. (Nos. 142 and 145), and a single plant of a very different species which he proposes to call

T. CONDENSATA (no number. See p. 103). — It has a proper caudex two inches long, marked with the scars of former leaves, and at the top bears a dense mass of small, oblong-spatulate, white-hairy leaves, and, buried among them, a single sessile head rather larger than that of *T. sericea*. The involucre is composed of numerous very narrow acuminate scales, which are lacerate-ciliate along the scarious margin. The pappus consists of rather long barbellate bristles, that of the (infertile?) rays similar but scantier. The rays are pale pink, and about eight lines long, and the disk-florets exceedingly numerous. Not having seen a specimen of Nuttall's *T. incana*, I have some doubt as to whether this may not be his plant of that name. If not, it may properly bear the name which Dr. Parry has proposed. It grew on a high peak in northwestern Wyoming. — D. C. EATON.

154. APLOPAPPUS (STENOTUS) MULTICAULIS.—*Stenotus multicaulis* Nutt., Torr. and Gray, Flora. Wind River.—An interesting rediscovery of this species, which seems to hold truly distinct from *A. acaulis*, which is also in the collection (157).—A. GRAY.

150. SCHKUHRIA INTEGRIFOLIA.—Hoary-puberulent, becoming glabrate; scapiform flowering stems a span high from a branching caudex, leafy only at base, bearing one to four or five loosely corymbose heads; leaves alternate, thickish and coriaceous, oval or sometimes oblong, entire, lightly 3-nerved, abruptly narrowed into a slender petiole; scales of the hemispherical involucre 10-14, oblong-lanceolate, acute, shorter than the disk; flowers yellow; rays 6-9, exserted, oblong, often 3-toothed; akenes linear-cuneate and 4-angled; paleæ of the pappus linear-lanceolate, hyaline, mucronate or short-awned by the excurrence of the stout midrib or else in the outermost flowers oblong and pointless. — Wind River valley, on high gypseous ridges.

A narrow-leaved form of this ambiguous composita (var. *oblongifolia*) was collected by Prof. Newberry in McComb's expedition several years ago, at "San Juan" (either in Utah or New Mexico); and Dr. Parry has now found it much farther north. The character here given is copied from a still unpublished revision which I have recently made of the genus, as now extended according to the views of Bentham in the Genera Plantarum, where it is made to include *Achyropappus* (of which section we have *S. Neo-Mexicana*, *S. Bigelowii*, *S. Woodhousei*, *S. pedata*, and *S. biternata*, all but the first published by me under *Bahia* or *Achyropappus*; and now the present species adds a peculiar section, *Platyschkuhria*, with perennial root, peculiar foliage and habit, but the head and flowers of *Achyropappus*. — A. GRAY.

153. ARNICA PARRYI. — About a foot high, hirsute and glandular; stem simple, naked above, bearing (excepting bracts) only one or two pairs of cauline leaves and 1-5 rather small heads; radical and lowest cauline leaves ovate or ovate-lanceolate with obtuse or acute base tapering into a short margined petiole, lightly 3-5-pliveined, acutely denticulate; the others small and sessile or bract-like; lateral peduncles short; involucre somewhat turbinate; rays none; akenes almost glabrous: pappus densely barbellate in the manner of *A. mollis*.—*A. angustifolia*, var. *discoidea latifolia* Gray in Sill. Jour. 33, p. 238. *A. angustifolia*, var. *eradiata* Gray in Proc. Acad. Philad., 1863, p. 68. Mountains of Colorado (Parry, Hall and Harbour, Greene), and now found by Dr. Parry in Wyoming. Rev. Mr. Nevius sends a specimen from the mountains in Oregon. Allied on one hand to *A. mollis*, on the other to broad leaved forms of *A. alpina*. Seemingly a well marked species in a genus the species of which are hard to limit.*—A. GRAY.

156. ARNICA FOLIOSA Nutt.—*A. Chamissonis* Torr. and Gray, in part. This is a dwarf and less downy form of a species which abounds from the Rocky Mountains to

* Our North American species throughout appear to have yellow anthers and more or less hairy corolla-tube,—except the two peculiar to Unalaska and the other Aleutian Islands, which have blackish anthers. Both were collected by Harrington and Dall in the exploration under the command of the latter; and they seem to be distinct, although Herder has lately combined them. *A. Unalaschkensis* has the tube of the corolla wholly glabrous. This is said to be the case in the original description of *A. obtusifolia* Less., but in our specimens the many jointed hairs common in the genus certainly occur. The *A. Chamissonis* of Schmidt's Flora Sachaliensis has the same dark anthers, and in foliage also differs considerably from the original *A. Chamissonis*.—A. GRAY.

the Sierra Nevada, in the latter region passing into var. *incana*, a densely white-tomentose variety. It is Nuttall's *A. foliosa*, which I had referred to *A. Chamissonis*, incorrectly, as I am now convinced, but all these species seem to run together inextricably. Nuttall's name is a good one, and so, on the whole, is the species which on a survey of the genus it seems necessary to revive.—A. GRAY.

202. PHELIPÆA (APHYLLON) LUTEA.—Resembles *P. fasciculata*: but the whole plant is of a light yellow color and more glandular-hairy; peduncles only about twice the length of the flower; corolla sulphur-yellow.—Dry and sandy hillsides, Owl Creek; parasitic on roots of grasses.—C. C. PARRY.

215. PEDICULARIS PARRYI Gray, *var.* PURPUREA.—Abundant in pine woods at the foot of Yellowstone Lake. I do not find any marked characters to distinguish this from *Pedicularis Parryi* of the Colorado Rocky Mountains, except the larger dull *purple* flowers, the lanulose-ciliate bracts, filaments slightly hairy, and leaves more sharply serrate, with the divisions *broader* and *less* divaricate.—C. C. PARRY.

218. ORTHOCARPUS PARRYI.—Differs from *O. pallescens* Gray in somewhat greater height (almost a foot high) and in the close and short cinereous pubescence; corolla broader and yellowish, its more decidedly trisaccate lower lip equalling in length the broad galea, its 3 lobes equal, oval, obtuse, about the length of the saccate portion.—Pacific Springs, etc. Flowers 7 lines long; the lower rather distant, in the axils of green and foliaceous laciniate-pinnatifid bracts; calyx 2-cleft to the middle, nearly equalling the yellowish corolla and apparently slightly yellowish.—A. GRAY.

CAREX TENUIROSTRIS Olney.—Spike ovate or nearly round (8–11 mm. long, 7–10 wide), composed of 5–10 or more spikelets in a dense head staminate at the base; bracts short, leafy, lower margins hyaline; stigmas 2; perigynium narrow, ovate, lanceolate (3·2 mm. long, ·8 mm. wide), tapering to a very slender beak with an obliquely cut membranous orifice fringed at top, faintly nerved, doubly serrate and winged on the margins from the base of the oblique cut to half way down, longer than the entire ovate acute hyaline green nerved scale (2–2·1 mm. long, 1–1·5 broad), never hispid; achenium straw colored, oblong, stiped (1·4 mm. long, ·6 mm. wide).—Stipe 4 mm. long; achenium 1·4 mm.; style 2·2 mm.; stigmas ·8–4·8 mm.; root fibrous, culm 6–8 cm. high, leaves flat; margin finely serrated, rough and pointed at top, narrow, and shorter than culm.

It resembles *Carex Haydeniana* in size, leaves and general aspect. It differs in the color of its spikes, its bracts, but principally in its perigynium which is narrower, and in its orifice fringed at top, and in this differing from its other close ally *C. leporina* and from *C. festiva* more remote. From *C. festiva* it differs as indicated, and in the wings and serratures of the perigynium not extending to the base.—S. T. OLNEY.

307. ISOETES BOLANDERI Engelm.—Trunk deeply 2-lobed; leaves (5–20, 2–4½ in. long) 4-angled, slender, tapering to a very fine point, bright green, soft; epidermis cells elongated; with stomata, but without peripherical bast bundles; sporocarp mostly oblong, covered about ⅓ or ½ by the velum, unspotted; macrospores (0·30–0·45 mm. wide) beset with minute points and wrinkles; microspores (0·026–0·31 mm. long) more or less papillose or spinulose, deep brown.—In ponds and shallow lakes on the Sierra Nevada of California, at an altitude of 5,000–10,000 feet, "scattered or rarely in small patches" (Tuolumne, Mount Dana, Mono-trail, Cisco, Mary's Lake, *H. Bolander*, 1866 and 1870), and on the Rocky Mountains, "densely cæspitose (Yellowstone Lake 7,400 feet alt. *C. C. Parry*, No. 307, 1873).

This species represents in the western mountain regions our eastern wide-spread *Isoëtes echinospora* var. *Braunii*, and the very local *I. saccharata*. Both collectors found it growing in soft mud covering gravel, and always submerged, but the abundant stomata would seem to indicate that the plant, at times, vegetates out of water. Leaves very slender, ⅛–½ lines in diameter in the lower third, very broad winged below and towards the base. The minute, mostly pointed warts on the macrospores are often confluent, and then represent short wormlike wrinkles; in some specimens I find them almost obliterated. The specimens from Yellowstone Lake are characterized by rather smaller macrospores (0·28–0·38 mm. wide) and a little smaller (0·026–0·029 mm.) almost smooth microspores, and may be distinguished as var. *Parryi*.

The only other species of Isoëtes, thus far found in the western mountains and on the Pacific slope, are:

ISOETES PYGMÆA Engelm.—Very submerged, few (5-10), short (¼ to 1 inch), stout,

rapidly tapering dark-green leaves, with very short, often even square epidermis cells, without stomata or bast-bundles; circular sporocarp with a very narrow velum; macrospores 0·36–0·50 mm. wide, marked with smaller and more regular, rarely confluent, rather sharp points; microspores (0·024–0·027 mm. long) brown, very minutely papillose or almost smooth.—In large patches in mud, covering gravel, deeply submerged in running water, on the Mono-trail, eastern declivity of the Sierra Nevada, 7000 feet alt., *H. Bolander*, 1866. Closely allied to the last species, distinguished by its stout, short leaves without stomata, and the markings of the larger macrospores, etc.; in many respects near *I. lacustris*.

ISOETES NUTTALLII A. Braun in litt.—Terrestrial, trunk scarcely lobed; leaves (20–60, 3–7 in. long) 3-angled, slender, firm, erect, light-green, with numerous stomata and 3 peripherical bast-bundles; sporocarp mostly oblong, entirely covered by the velum; macrospores (0·35–0·52 mm. wide) densely covered with minute but prominent, rounded warts; microspores (0·025–0·028 mm. long) papillose, deep brown.—On damp flats or springy declivities in Oregon; on the Columbia, *Th. Nuttall*, 1833; Camass Prairies of the Cœur d'Aleines, *Chs. Geyer*, 1843; Willamette valley, *E. Hall*, No. 693, 1871. Thin but firm leaves, as most land Isoëtes have, with three strong bast-bundles corresponding to the 3 angles. Trunk rhombic in transverse section, only superficially divided by a shallow groove into two lobes. Closely allied to *I. melanopoda* of the Mississippi Valley, which Mr. Hall lately discovered also in Texas, but resembling in the velum the two Florida species *I. flaccida* and *I. Chapmani*.

ISOETES ECHINOSPORA Dur., var. BRAUNII Engelm.—In the Uintah Mountains, at 9500 feet alt., *S. Watson*. The westernmost and the highest known locality of this species.—G. ENGELMANN.

ÆCIDIUM PSORALEÆ.—Spots none; peridia abundant, generally occupying all the lower surface of the leaf, rarely a few on the upper surface, short margin crenulate; spores sub-globose and sub-elliptical, brownish yellow when fresh, yellowish when dry, ·0007–·0008 inch long.—Parasitic on leaves of *Psoralea floribunda*, Colorado Territory.—C. H. PECK.

ÆCIDIUM PARRYI.—Spots none; peridia usually occupying all the lower surface of the leaf, prominent, bright-colored, margin subentire; spores subglobose, bright chrome yellow, ·0008–·0009 inch in diameter.—Parasitic on leaves of *Smelowskia calycina* Meyer. Wyoming Territory.—C. H. PECK.

REVIEWS AND BOOK NOTICES.

REVISION OF THE ECHINI.*—The third part of this elaborate work, the first and second parts of which we noticed in the preceding volume of this journal, has appeared printed in the same beautiful style as the preceding portion.

The present part contains the descriptions of the species of recent Echini (sea urchins), with a full discussion of the ordinal and subordinal characters. The plates are beautifully executed with many details both of the external parts and the internal anatomy.

* Illustrated Catalogue of the Museum of Comparative Zoology at Harvard College. No. vii. Revision of the Echini. By Alexander Agassiz. Part iii with 45 plates and the plates illustrating Part iv. Cambridge, 1873. Royal 8vo. pp. 383–628.

HAYDEN'S GEOLOGY OF THE TERRITORIES.—The second part of our notice of this interesting volume (see p. 726, vol. vii) has

Fig. 58.

Rim about a Geyser-tube, Upper Fire Hole Basin.

been unavoidably crowded out of our pages. We have already referred to the wonderful geysers and hot springs of the Yellow-

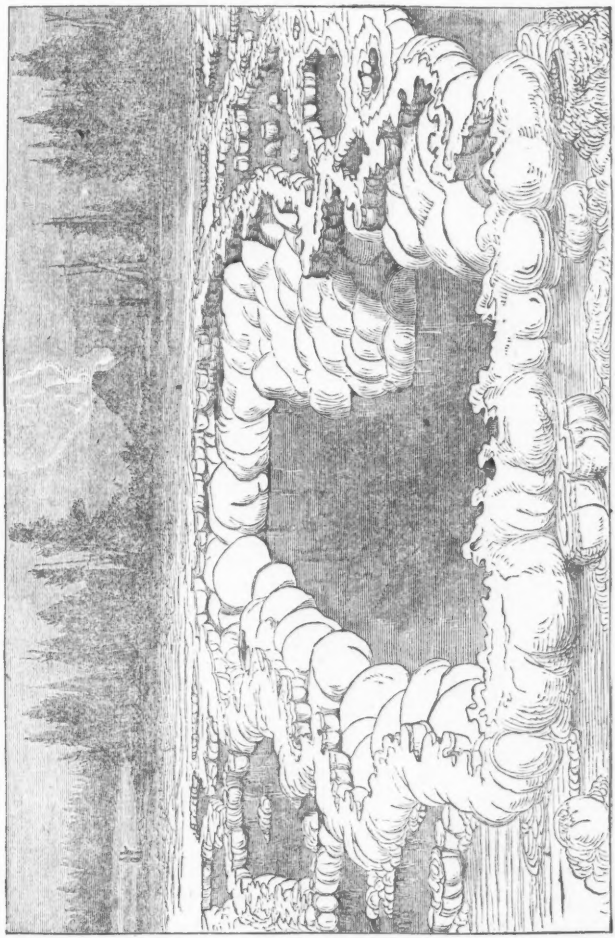
Fig. 59.

Globular Masses in the Crater of the Turban Geyser.

stone region. In Dr. Peale's report occur the accompanying illustrations of these phenomena:—Fig. 58 illustrates a rim about a Geyser-tube, on the Upper Fire Hole Geyser Basin, due to the silex precipitated from the heated waters; Fig. 59, globular masses in the crater of the Turban Geyser; and Fig. 60 shows the ornamental character of the border of the springs, while Fig. 61 is a view of the singular basins of hot springs at Gardiner's River, in the Yellowstone National Park.

In his rather long and interesting report on the lignite coal

Fig. 60.



Oblong Geyser near the Giant, Upper Basin, showing the ornamental character of the borders of the springs.

and its flora, Prof. Lesquereux brings forward new facts in regard

to the analogy of some vegetable forms of our Cretaceous rocks with the plants of our time, and also of the Miocene flora of Europe; and he maintains that the whole lignitic coal formation of the Rocky Mountains is, "from the base of the fucoidal sandstone, a Tertiary-Eocene formation." Prof. Meek follows with a

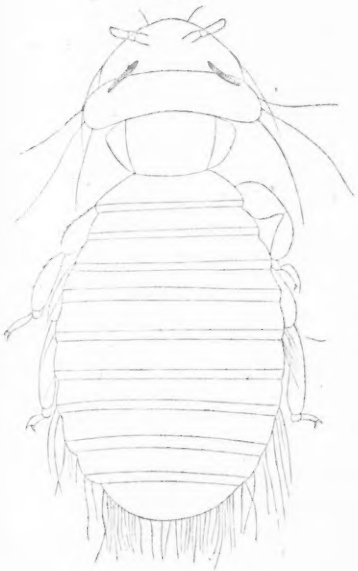
Fig. 61.

Basins of Hot Springs at Gardiner's River, Yellowstone National Park.

report on the invertebrates, and Prof. Cope reports on the Eocene vertebrate fossils of Wyoming, with several lithograph plates; concluding with some remarks of much interest on the character of the types of vertebrates, giving phylogenies of the mammalian orders and of the genera of the Testudinata. Other papers are contributed by Messrs. Leidy, Thomas, Merriam, Horn, Hagen,

Packard, Coulter, Gannett and Stuart. Dr. Packard describes several new species of bird lice, i. e., *Menopon picicola* (Fig. 62), *Goniodes Merriamanus* (Fig. 63), *G. mephitidis* (Fig. 64) from the skunk, *Nirmus buteonivorus* (Fig. 65) and *Docophorus syrnii* (Fig. 66), the latter from New York, with some notes on the common

Fig. 62.



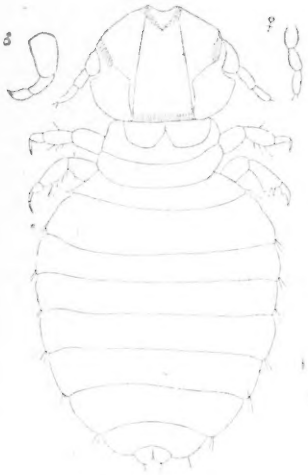
Parasite of Woodpecker.

Fig. 63.

Parasite of Dusky Grouse.

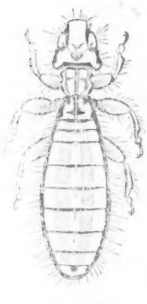
cattle tick of the west and Central America (Fig. 67), *Ixodes bovis*, upper figure, natural size, lateral view; lower, enlarged, with the mouth-parts (67 *a* much enlarged). A description is added of the Texan *Argas Americana* (Fig. 68, much enlarged), a near ally of the well known *Argas Persicus* which is so annoying to travellers in Persia.

Fig. 64.



Parasite of Skunk.

Fig. 65.

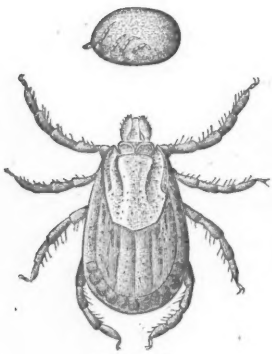


Parasite of Swainson's Buzzard.

Fig. 66.

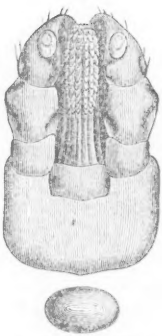
Parasite of Barred Owl.

Fig. 67.



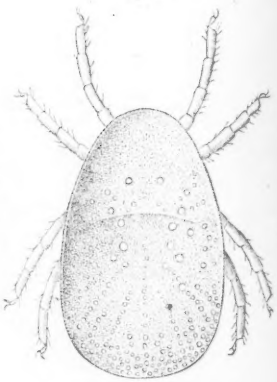
Cattle Tick.

Fig. 67 *a*.



Mouth parts of Tick.

Fig. 68.



American Argas.

GIRARD'S INSECTS.*—This is a French work modelled after a similar plan to Packard's Guide, but much more pretentious and less convenient for daily use; like the latter, it contains special reference to injurious insects and will prove of particular value to agriculturists.

The introductory portion covers two hundred and forty pages and is divided into eight sections: *i. e.*, on definitions, on the anatomical and physiological study of the functions; on the nervous system; on instinct and intelligence; the chase and preservation of insects; on paleontology; on geographical distribution; and on species and classification. Nearly half of the introduction is devoted to the second section (on the functions) which includes also much that is of great interest to the general student. We naturally look for twenty pages on animal heat, where the reader will find the result of Mr. Girard's researches in very convenient form. A long chapter is devoted to the mode of collecting and preserving insects and the introduction is terminated by a list of important entomological works.

In the special part of the work the author defines in general language the characteristic features of the larger groups, and under each gives brief descriptions of the principal genera; species are not treated at length unless they are injurious; thus fifteen pages are given to the cockchafer. The history and habits of the insects are briefly described, so that the work becomes a running commentary upon the principal forms of beetles; our own acquaintance with Coleoptera is insufficient to enable us to judge how carefully the later sources of information have been gleaned, but there is no reference whatever to LeConte's views of the position and value of the Rhynchophora.

The plates accompanying the volume, except the first six, which are anatomical, are confined to Coleoptera, and with a single exception are the same as those published years since in Guérin's "Iconographie du Règne animal," but a few figures have been replaced by new illustrations. References to the plates are made throughout the work, but we miss a connected reference to any but

* Les Insectes. Traité élémentaire d'entomologie comprenant l'histoire des espèces utiles et de leurs produits, des espèces nuisibles et les moyens de les détruire; l'etude des métamorphoses et des mœurs les procédés de chasse et de conservation; par Maurice Girard. Introduction, Coléoptères, avec atlas de 60 planches pp. viii, 840. 8vo. Paris, 1873.

those which treat of anatomy. There is also no index. These defects will doubtless be remedied at the close of the whole work, which must continue through several volumes. — S. H. S.

Solar Physics.* — Our geological readers will feel an interest in a work by one of the pioneers in the new series of researches on the nature of the sun, which have tended to take astronomy out of the exact sciences and place it on a rank with its sister science, biology. The work is largely an essay on cosmical geology. In many ways it commends itself to the geologist and biologist, and is a fresh illustration of the close connection existing between the various branches of physical science. It is divided into two parts: I. A popular account of inquiries into the physical constitution of the sun, with special reference to recent spectroscopic researches; and II. Communications to the Royal Society of London, and the French Academy of Sciences, with notes.

The first part is naturally of more general interest, embracing topics of which the following are some of the subjects:—What is a Sun; The telescopic Appearance of the Sun; The Sun as a Type of the material Universe; The Place of life in a Universe of Energy; The Atmosphere of the Sun, and several chapters on the Eclipse. The style is clear and interesting, while the spirit of the writer is sanguine and bold, such as has marked the editorial conduct of "Nature," in which journal some of these essays have appeared.

Certainly the author has reason to thank his publishers for the sumptuous appearance of the volume, taking rank as it does with the most beautiful works of a similar nature that have appeared recently in England and France. All devout astronomers should, as becoming their profession, thank heaven for the appearance of so fair and enticing a work, which will win its way to the warm appreciation of many a non-astronomical reader.

The Birth of Chemistry.†—This little book is a reprint of an interesting series of papers which have appeared in "Nature." It is a résumé of the earlier history of chemistry, before it became a science, from the times of the early Greek philosophy

*Contributions to Solar Physics. By J. Norman Lockyer. London, Macmillan and Co. 1874. 8vo. pp. 676. With colored plates and numerous woodcuts. $10.00.

†The Birth of Chemistry. By G. F. Rodwell. With numerous illustrations. Nature Series. London, Macmillan and Co., 1874. 12mo., pp. 135. $1.25.

down to that of the fathers of modern chemistry, Lavoisier, Priestley and others, but not including their works. Those who know nothing of chemistry will find this account entertaining. The illustrations will add to its interest.

North American Moths.*—The 8th and 9th parts of Mr. Stretch's interesting illustrations, completing vol. i, have appeared with three plates, the last of larvæ, some of them only tolerably well drawn, but of great interest. Though the work is partly a compilation, yet much original matter is incorporated, and it is the only manual we have of the most interesting portion of our moth-fauna. Several new species, western and Pacific, are described and figured.

BOTANY.

Investigations respecting the fertilization of Abutilon.—The complete sterility of certain plants with pollen from the same flower (*Corydalis cava*), or even from all flowers from the same stock (species of Abutilon, Bignonia, Oncidium, etc.), is only a remarkable case under the law that self-fertilization gives rise to weaker descendants than crossing. And, further, this law, of which a proof is afforded by every flower which, through the attraction of odor or color, invites bees or butterflies to the enjoyment of honey, and thereby to the accomplishment of crossing, is only a particular case under the more general law, viz;—that close breeding in-and-in between near relations is productive of mischief; for speaking of individual cases, anthers and pistil of the same individual plant, or the same flower, are the closest conceivable relatives.

A still more general scope can be given to the last law if we comprise in it, also, the diminution of fertility, which, in all degrees even to complete sterility, occurs as a consequence of close relationship of the plants crossed, and in the union of hybrids. Every plant, so to speak, requires for the production of the strongest possible and most prolific progeny, a certain amount of difference between male and female procreative elements which unite. Fertility is diminished as well when this degree is too low (in relatives too

* Illustrations of the Zygænidæ and Bombycidæ of North America. By R. D. Stretch. Vol. i, parts 8 and 9 (and last). San Francisco, Cal., 1874. 8vo., pp. 185–242.

closely allied), as when it is too high (in those too little related). The complete accord between "illegitimate" descendants of dimorphous and trimorphous plants on the one side, and hybrids of different species on the other side, authorizes in fact such a grouping together under a common point of view of kinds of infertility occasioned by opposite causes. It is self-evident that the fact can be merely expressed, but not explained. Likewise, naturally, only one of the many relations conditioning the greater or less fertility of a union can be expressed.

In a species the greater the difference of sexual elements, requisite to the attainment of the highest degree of fertility, the greater will be, in general (*cæteris paribus*), the difference between the plants which can produce offspring with each other. In other words, species which, with pollen of the same stock, are wholly sterile, and even with pollen of nearly allied stocks are more or less infertile, will generally be fertilized very readily by the pollen of another species. The self-sterile species of the genus Abutilon, which are, on the other hand, so much inclined to hybridization, afford a good example of this theory, which appears to be confirmed, also by Lobelia, Passiflora and Oncidium.

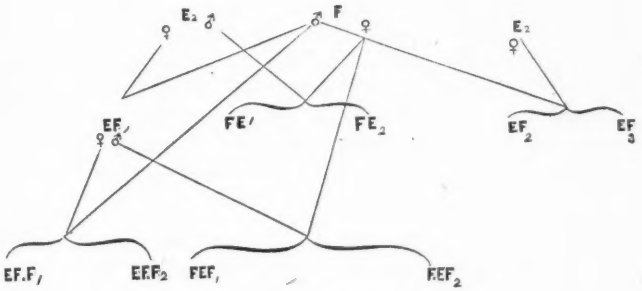
I will not further present these general observations. They merely indicate in what sense, and in what connection I have wished to look upon the following example of infertility between near relations.

In the following *A. C. E. F. M. P.* denote six indigenous species of Abutilon. . . . . For indicating the simple hybrids the letters of the united species are placed in juxtapositon without other signs, and the *maternal* species *first*. Thus *EF* stands for a hybrid whose mother is *E* and whose father is *F*. In the case of union of these simple hybrids among themselves or with simple species, a point is placed between the symbol of the mother, and that of the father following; *F. CF* had. consequently, *F* for the mother, *CF* for the father; *CE. S* had *CE* for the mother and *S* for the father. Numbers placed under and at the right of the letters denote the individual stocks of a species or a hybrid; FS_1 FS_2 FS_3 are, for example, three different stocks of the hybrid *FS*.

The four plants $EF.\ F_1$, $EF.\ F_2$, $F.\ EF_1$, $F.\ EF_2$ are brothers and sisters, having had the same parents *F*, and EF_1.

Nine flowers of $F.\ EF_1$ dusted with pollen of other flowers of the same stock produced not a single fruit.

Twenty flowers of *F. EF*$_1$ dusted with pollen of *F. EF*$_2$, *EF. F*$_1$, and *EF. F*$_2$, produced three fruits with an average of 1·3 seeds.



On the other hand there were the following results with

							Seeds.
10	Flowers	*F. EF*	impregnated by	*FE*, and *FE*$_2$	10	fruits	4·5
11	"	"	"	" *EF*$_2$ " *EF*$_3$	10	"	4·6
10	"	"	"	" *F*	9	"	4.6
6	"	"	"	*F. CF*$_1$ and *F. CF*$_2$	6	"	4·5
1	"	"	"	" *FS*$_1$	1	"	4.7

The results following the dusting of the brothers and sisters were not owing to the bad behavior of the pollen since on other plants it was completely potent; the pollen or *F. EF*$_2$ produced fruit rich in seeds in the plants *FS*$_1$, that of *EF. F*, on *FE*$_2$, that of *EF. F*$_2$ on *F*. Also the pollen of *F. EF*$_1$, produced numerous seeds which so far as sown appear capable of germinating, from the plants *F. F. CF*$_2$, *FS*$_1$, and *FS*$_2$.

The seeds produced by *F. EF*$_2$ and *F. EF* have, moreover, germinated and given strong plants which, up to this time, have kept pace in growth with those from *EF*$_2$, F, *F. CF*$_2$, and *FS*$_1$.

The foregoing examples show that in hybrids of Abutilon, and probably so in pure species of the genus, there are many cases of more or less complete infertility between nearly related plant-stocks, between parents and children, between brothers and sisters and even half brothers and sisters. If the foregoing exposition of the connection between relationship and fertility is correct, we may hope to indicate in other plants similar instances of diminished fertility through too near relationship, but we may expect to

find complete sterility between relations in those species only which like Abutilon are infertile with pollen of the same stock. . . . .

Darwin, with his accustomed keenness of vision, has expressed* the conjecture that this diminution of fertility, observed so many times, is not a consequence of their hybrid nature, but of too close breeding in-and-in, and I am glad to be able to offer, in the examples of diminished fertility and complete sterility as a consequence of too close breeding in-and-in, in Abutilon-hybrids, herewith communicated, a new proof of the accuracy of Darwin's hypothesis. —*From the German of Fitz Müller, Itajhy, Oct.*, 1872. G. L. G.

The Fertilization of Gentians by Humble Bees.†—The fringed gentian (*Gentiana crinita*) resembles the above in having erect flowers and the stamens below the stigmas. The fringed lobes of the corolla spread at right angles. Humble bees work upon this very much as they do upon Andrews' gentian.

There seems to be almost no end to the various contrivances by which flowers are fertilized by insects. Flowers closely allied, of the same genus, are fertilized in different ways, so it is not safe to make general rules. We may think that insects will act in a certain way, according to our notion, but after carefully watching them, we shall often see that they are not doing as we supposed they would. We need many patient observers for many years yet, to repeat observations made on this subject and to make new ones; we want to know how our insects behave upon every species of flower from the time they first visit it, to the time it affords no nectar to attract them.—W. G. Beal, *State Agricultural College, Lansing, Michigan, Nov.* 8, 1873.

ZOOLOGY.

Gigantic Cuttle-fishes of Newfoundland.—It seems, as will be seen by the following correspondence, that we were incorrect in saying that the first letter of Mr. Murray on this subject was addressed to the late Prof. Agassiz (p. 120). It was in fact written to Prof. Marcou. We make reparation for the inadvertency by publishing the following letters from Prof. Agassiz, of which copies have been furnished us by Prof. Marcou. They are

* Orig. Sp., 4th ed., 295.

† By an oversight omitted from the note on p. 180.

interesting as being the last scientific letters written by their lamented author: —

MUSEUM OF COMPARATIVE ZOOLOGY,
Cambridge, Mass., Nov. 25, 1873.

My Dear Sir:—My friend Marcou has communicated to me your most interesting letter; and I am delighted at last to have so direct information concerning the gigantic cephalopods of the Atlantic, of which so much has been said since the days of Pontoppidan. I will now hunt up everything that is worth noticing upon the subject, and if you will allow me an examination of your specimen, the zoological characters of the creature might be made out from the parts preserved, as we do of imperfect fossil remains. I would also ask leave to publish the substance of your letter to Mr. Marcou, in connection with this. With great regard, yours very truly, (Signed) L. AGASSIZ.

ALEX. MURRAY, Esq., St. John, Newfoundland.

MUSEUM OF COMPARATIVE ZOOLOGY,
Cambridge, Mass., Nov. 26, 1873.

My Dear Marcou:—Thanks for the letter and the photograph that Mr. Murray has sent you. It is very curious, and with your permission, I shall publish the contents accompanied with remarks if Mr. Murray should send me one of the large suckers in order to compare it with those of the species of cephalopods known on our coast. I have written him to this end. I have made a copy of Mr. Murray's letter, and return you the original. The more I consider this discovery, the more does it interest me. It is truly important for the history of cephalopods. Ever yours,

(Signed) L. AGASSIZ.

Prof. JULES MARCOU.

LAWS OF GEOGRAPHICAL VARIATION IN NORTH AMERICAN MAMMALS AND BIRDS.—My attention of late having been again especially directed to this subject, I wish to say a word respecting a discussion that occurred concerning it in the NATURALIST some months since, during my somewhat protracted absence in the west; particularly in respect to Mr. Ridgway's article in the September number (vol. vii, pp. 548–555). With all due deference to the important contributions Professor Baird has made towards our present knowledge of this subject, I think Mr. Ridgway has hardly fairly represented the case. After stating what he claims as Professor Baird's generalizations, four in number (see Mr. Ridgway's article), he says: "Here then are three laws of climatic or regional variation in size and proportions, and two of color, in which Mr. Allen is anticipated by Professor Baird."

Generalization "1" of Mr. Ridgway's enumeration refers to variation in size with locality, and is a law which was most unequivocably established by Professor Baird. Generalization "2" refers to the enlargement of the bill in Florida and cape St. Lucas birds, while generalization "3" refers to the "longer tails of western birds than of eastern examples of the same species." Generalization "4" refers to color, and will be presently noticed more in detail. In respect to generalizations "2" and "3," Professor Baird only refers to the disproportionate enlargement of the bill and tail at certain localities, as noteworthy facts, and, so far from explicitly stating them as general laws, he says in a foot-note, referring to the increased size of the bill, "This disproportionate difference of size at cape St. Lucas and south Florida is probably connected with the limited range of the species in those regions, which have thus an insular rather than continental relationship;"* thus apparently looking upon these variations as local phenomena. Neither in the case of the enlarged bills, nor the lengthened tail, does he hint at any general geographical law of variation of which these are simply the expressions, whereas my announcement of the *law of the enlargement of peripheral parts to the southward* included not only those instances noticed by Professor Baird, but a multitude of others I had myself observed, both among mammals and birds, and at numerous localities in addition to Florida and lower California. In respect to the tail it was increased in length at the *southward*—not at the *westward*—in accordance with the above law to which I called attention.

As regards laws of color variation, Professor Baird merely makes the general statement that "specimens from the Pacific coast are apt to be darker in color than those from the interior, the latter frequently exhibiting a bleached or weatherbeaten appearance, possibly the result of greater exposure to the elements and less protection by dense forests,"† whilst I announced a region of more rufous tints in the middle portions of the continent, darker tints on the Pacific coast north of latitude 40°, and light colors from the arid plains and deserts, as well as the law of increased intensity of color to the southward; at the same time correlating these general facts with the relative amount of aqueous precipita-

* Amer. Jour. Sci. and Arts, 2d series, vol. xli, p. 191.
† Amer. Jour. Sci. and Arts, 2d series, Vol. xli, p. 192.

tion and the hygrometric conditions of the atmosphere over these different areas of the continent.

The statement Mr. Ridgway makes, notwithstanding the generally complimentary tone of the article as regards the present writer, that all the laws I announced (with one exception) "are substantially the same as the generalizations made by Professor Baird in 1866," seems to me to be by no means wholly warranted. Being forced to refer to the matter, I may as well state here that I claim the three following general laws as original: viz: 1, increase of intensity of color southward; 2, greater depth of color with increased atmospheric humidity; 3, enlargement of peripheral parts to the southward. These, with the fourth law relating to size, cover, in a general way, geographical variation in proportion, size and color. Baird's law of size and his facts of variation in respect to the proportional development of parts, taken with similar ones I had myself observed, were of course incentives to further research, and suggestive of the probable existence of some general laws of geographical variation of which these facts were the expressions.—J. A. Allen.

The Habits of Polistes and Pelopæus.—My friend, Mr. Uhler, will pardon my incredulity; but the conviction forced itself on my mind, in reading the interesting paper on pp. 678–9, vol. vii, that some one had sadly confounded the two genera above mentioned.

First, the description of the mud cells exactly applies to those of our common *Pelopæus lunatus* Fabr., as do, also, the descriptions of the method of building, and of storing them with young spiders. The actual cells, which I saw at Portland, would be at once recognized as belonging to this species by those familiar with its habits—the unusual length of some of them resulting from the nature of the beetle burrow or cavity in which they were built. *Secondly*, the habit which Mr. Uhler deems exceptional, or not belonging to Pelopæus, viz., that of not nursing its young and of sealing up the cell when once stored is precisely the habit which *does* belong to Pelopæus and which *does not* belong to Polistes. Mr. F. Smith has recorded facts which would indicate that some of the digger wasps, such as Mellinus, may open their burrows from time to time to supply fresh food to their young;* but we have yet no positive proof of the fact, and I know of nothing on

* Ann. and Mag. Nat. Hist., May, 1869.

record to indicate that any other digger wasp does so. The fact that old mud dabs are often found, in which the wasp egg had failed to hatch, and in which the spider food, in consequence, had not been appropriated, is sufficient proof, if proof were wanting, that Pelopæus never does so.

The habits of Polistes, as I think every one who has observed them must admit, are absolutely incompatible with Mr. Uhler's conclusions. They have recently been most admirably set forth by Siebold in his last work on Parthenogenesis.*

A large weather-worn impregnated female or queen founds the colony in spring, by the construction of a peduncled, gray, paper-like cell, at the bottom of which an egg is deposited. The cell is enlarged as fast as the larva increases in size, and other cells are, meanwhile, built adjoining the central one. The young are always fed with the masticated flesh of other insects, such as small caterpillars, small moths, etc., and the mother always rejects the food found in the stomachs of these herbivorous species. The cells are never closed until the full grown larva closes them. The first generation consists of females only; or, more properly, female workers differing from the workers of Apis in being always fertile, but, from necessity, parthenogetically so. They have precisely the same structure as the queen, but are distinguished by their smaller size and brighter color, especially of the wings. By their aid the nests increase in size, or new nests are built, and in the fall of the year the larger females and the males appear. Occasionally honey is found in the cells, but its use is not fully understood.

Now have we a species so divergent from this habit as to borrow the very different habit of Pelopæus? For my own part I have too much faith in the unity of habit in the same genus to believe it without better evidence. Larrada and Sphex, which generally burrow in the ground, present exceptional species which build nests above ground in the curl of a leaf,† but the species which thus diverge in habit also diverge in structure from the typical genus. Again in Agenia which generally builds mud cells above ground, Mr. Smith has shown that one species (*A. variegata*) burrows in the ground. Yet these exceptional differences in the habit of the same genus do not begin to compare with those

*Beiträge zur Parthenogenesis der Arthropoden, 1871.
†Packard's "Guide," pp. 165 and 169.

between the habit of Pelopæus and Polistes; and if Mr. Uhler's observation is a correct one, it is a most remarkable entomological discovery.

The Polistes which Mr. Uhler exhibited at Portland is a quite common species (or perhaps, more correctly speaking, variety), marked in my cabinet *P. fuscatus* Fabr., and which *I know to build paper-like nests*, according to the habit of the genus. In winter collecting I constantly meet with it and other species hibernating in old hollow logs and stumps, and I cannot help thinking that Mr. Bryan, finding it in the same log with his mud cells, jumped to the conclusion that it was the architect of those cells; and that its yellow marked body and legs prevented his distinguishing it from *Pelopœus lunatus* which he afterwards observed building mud cells. At all events, I hope Mr. Uhler will tell us whether or not he himself observed any of the habits described, and will give us that confirmation, of so anomalous a fact, which will prevent all incredulity about it in the future, and which the article in question fails to give.—C. V. Riley, *Dec.* 3, 1873.

Notes on the Plant Lice.—That aphides, in the spring of the year, are developed into wingless forms from ova which were deposited at the close of the preceding autumn, and which have remained dormant during the famine winter months, I believe was the theory of naturalists till the year 1852. At this time Prof. Owen, in his famous Hunterian lecture on the generation of insects, claimed the reproduction of winged individuals to be an occasional occurrence, and also the exceptional mode.

My observations during the past season have been of such a character as to indicate that the professor is not wholly correct. From the first appearance of plant lice down to within a comparatively recent date, numberless winged individuals of *Aphis rosæ*, *mali*, etc., have been noticed, associated with clusters of the apterous form, but more usually single or in pairs, upon their favorite plants, at such distances from well-established colonies as to give warrant to the belief that wings were solely acquired for the purpose of diffusing the species.

In some carefully conducted experiments which I have made, some of these winged forms proved quite as prolific as the wingless; while others, apparently of the same age, manifested indications of sterility, from which latter fact it seems just to conclude that these were sterile females.

Further, it has been strongly affirmed by those who have made this peculiar group their study down to the aforementioned date, that procreation from a virgin mother continues until the eleventh generation is exhausted; and that when this period has been reached, winged individuals of both species make their appearance, which, after having celebrated their nuptials in mid-air, repair to some suitable plant where the females deposit their ova for the continuation of the species, after which they both die. Prof. Owen, in his writings, says "When this exhaustion occurs, some members of the last larval brood are metamorphosed into winged males, others into oviparous females," the latter being apterous. That such is only partially true I am satisfied from observations made during the latter part of October upon the *A. mali* of Harris.

This species, from its convenience, has received very careful attention. On the 26th of October last, while engaged in an examination of some of the principal shoots of a *Spiræa corymbosa*, which seem to be particularly adapted to the growth and well being of the above species, I observed hundreds of wingless females engaged in oviposition. Directing my glass to the leaves, where scores were still deriving a scanty and precarious subsistence, I noticed many smaller specimens which presented quite a contrast as regards size when placed by the side of their plump associates. The former, from the endearment which they lavished upon the latter, I soon satisfied myself were males. Upon other portions of the same field of view were many in the act of copulating. One particular phase of animal life very forcibly impressed my mind on this occasion; to wit, the ardent temperament of the males, and the comparative unconcern of the females previous to coition.

Long and anxious watching has convinced me that in the fall of the year not a single winged individual of either sex is to be found in this species, and further that the essential duties of reproduction and of oviposition are performed without the necessity of wings, and generally upon the very stalks where the insects were born and lived.

In size, the males of *A. mali* are vastly inferior to the females, being less than one-half the latter. Externally they appear like undeveloped females. Upon any other occasion than the present, I should assuredly have characterized them as females which a healthy, vigorous nutrition would have pushed unto perfection.

That they are males has been conclusively shown. But what has wrought the change? I think it can be shown that lack of nutrition, in consequence of a diminished supply of sap to the leaves, has been the instrument at work. If continuance of warmth and consequent plant-vitality are conditions favorable to an almost endless succession of the female type, a reverse order of things, by acting in a sudden manner, and at a certain stage of female life, producing a check to further development, must assuredly generate the opposite sex.— T. G. GENTRY.

A STRAGGLER IN THE OHIO.—On a recent visit to the Museum of Comparative Zoology my attention was called by Mr Bliss to a small fish labelled in my own handwriting several years since as follows: *A singular fish of a rare genus, Louisville, Ky.*, 1837. Nothing further is known as to the history of the specimen, but as 1837 was some ten years before Professor Agassiz began to form the unrivalled collection of fishes to which this specimen belongs, it is very probable that the label was a copy of some older one on the bottle in which the fish was received at the Museum, simply rewritten by myself sometime between 1856 and 1864. On making a careful examination of the fish it proved to be the *Gobiosoma molestum* of Girard, who described the species from a specimen obtained by Mr. J. H. Clark at Indianola, on the coast of Texas. Girard's description, with a figure, is in the Mexican Boundary Survey (Ichthyology, p. 27, pl. 12, fig. 14), 1859. Girard also describes the genus and species in the "Proceedings of the Philadelphia Academy," 1858, p. 169. The description by Girard applies perfectly to the Louisville fish and his figure is nearly correct. I note the following slight differences. Girard's specimen was two inches in total length, the Louisville specimen is two and one-half inches; Girard gives the fin rays as follows; dorsal VII + 12, anal 11, ventral 5, pectoral 16, caudal 20. My count of the Louisville specimen is, dorsal VII + 12, anal 12, ventral I + 5, pectoral 18 or 20, caudal 20; so that there is no important variation. Ventral 5, as given by Girard is probably a mistake due to his overlooking the small ventral spine which is common to nearly all members of the family. The proportions of the two fishes are the same. Girard's figure represents the rays of the first dorsal a little too far apart and the last rays are too short, as there is but little difference in the length of the rays of this fin. The

rays of the dorsal are also slightly too long in proportion to the size of the fish figured, and the pectoral fin is also a little too long. The anal fin should be about one ray nearer the caudal. In the Louisville specimen the two dorsals are slightly connected at the base by a low membrane. This specimen has been so long in spirits that no markings of color can be traced, but the membrane of the fins shows dark shadings made up of small dark points.

Taking it for granted that the label is correct, this little fish must have made the perilous passage up the Mississippi river into the Ohio river, a journey north of about eight degrees of latitude and of many hundred miles distance. That it is not impossible for the fish to have made such a journey from salt to fresh water, we have the knowledge expressed by Dr. Günther as follows:—"This family [Gobiidæ] offers numerous instances of the fact, that a part of the individuals of one and the same species are entirely confined to fresh waters, whilst others live in the sea."

Independently of the interest given by the very probably correct label locating the place of capture as the Ohio river, the examination of the fish has proved that Girard's species is a valid one and distinct from the *Gobiosoma alepidotum* of our eastern Atlantic coast. This last is a more slender fish and differs in several other particulars. Should any of our readers have the opportunity of collecting the small fishes of the rivers flowing into the gulf of Mexico it would be well to be on the lookout for other specimens of the *Gobiosoma molestum*, which can be easily distinguished from other small fishes of our rivers by the following characters: head and body *without scales;* head about one-fourth the total length of the fish; eyes prominent and situated *very near together* on the anterior part of the head; two fins on the back, the anal fin under the second dorsal fin, pectoral fin rounded and well developed, tail fin rounded, ventral fins situated between the pectorals *and united together, forming a single pointed fin* lying close to the abdomen. —F. W. Putnam.

"Assembling" among Moths.—I send you the following account of some of my observations, which you are at liberty to publish if you think it of any interest to your readers. Something like seven or eight years ago I was engaged in making a collection of insects and during the winter had collected quite a number of cocoons of the *Attacus Promethea* moth (Harris) which

were placed for safe keeping in the furnace room of a small greenhouse, the doors and windows of which were kept closed to prevent the escape of the insects. One afternoon in the month of June, I observed a strange insect fluttering about the greenhouse, which it soon entered through a ventilator, where I captured it, and found it to be a male of the above mentioned species, an insect which, until then, I had never seen. During the afternoon, when upon another part of the farm, I saw another specimen, also a male, flying high and directing his course straight for the greenhouse. I was struck with the coincidence of seeing two of these insects in the same afternoon, but was fairly astonished upon entering the greenhouse in the evening to find some half a dozen of them, *all males*, sitting about upon various parts of the building, and apparently patiently waiting. They were all immediately killed and pinned. The next morning, when I entered the furnace room, I found that during the night one of my cocoons had produced a splendid *female* moth. Did those males come upon an errand of love? If so, by what sense were they guided to the right spot, a place entirely unlike the natural haunts of the insect?

During the past winter in riding about the country I collected several cocoons of this moth for the benefit of a young naturalist friend of mine, but retained one, which I hung upon the wall of my office.

On the morning of June 21st, a fine female moth came out and was the object of considerable interest to the occupants of the room. During the day I related the above incident to a gentleman and at the same time described the appearance of the male insect. I had occasion to be absent from the room a short time during the afternoon, and upon my return was told that a male moth had been there and fluttered in and out at the open window several times, but had finally disappeared. The next day was Sunday and the office was closed, but on Monday afternoon a male again made his appearance at the office window, came in, and after fluttering about the room for a space of ten or fifteen minutes, found the object of his search, and the connection was consummated before our very eyes. Let it be remembered that the office is situated upon the principal business street, in the centre of the city, and from half a mile to a mile from any place where such an insect would naturally be found. A friend who has a store some half a mile from my office upon the same street, has

had an experience of the same kind. A cocoon which hung in her store produced a female moth, and within the next two days her store was visited by half a dozen of the male insects. Can any one tell me what fine sense this may be which guides this insect so far, and into such strange places in search of his waiting mate?—F. E. L. Beal, *Fitchburg, Mass., July* 7, 1873.

[We print the above as fair examples of "assembling" among moths. Nearly every entomologist has had similar experiences. It is a common occurrence. We are disposed to think that the male is guided by the sense of smell, as the antennæ of the silk moths probably possess this as well as the sense of hearing.—Editors.]

Organs of Hearing in Insects.—At the last meeting of the National Academy of Sciences, Professor A. M. Mayer exhibited experimental confirmation of the theorem of Fourier as applied by him in his propositions relating to the nature of a simple sound, and to the analysis by the ear of a composite sound into its elementary pendulum-vibrations; and to show experiments elucidating the hypothesis of audition of Helmholtz. Placing a male mosquito under the microscope, and sounding various notes of tuning-forks in the range of a sound given by the female mosquito, the various fibres of the antennæ of the male mosquito, vibrated sympathetically to these sounds. The longest fibres vibrated sympathetically to the grave notes, and the short fibres vibrated sympathetically to the higher notes. The fact that the nocturnal insects have highly organized antennæ, while the diurnal ones have not; and also the fact that the anatomy of these parts of insects shows a highly developed nervous organization, lead to the highly probable inference that Prof. Mayer has here given facts which form the first sure basis of reasoning in reference to the nature of the auditory apparatus of insects.

These experiments were also extended in a direction which added new facts to the physiology of the senses. If a sonorous impulse strike a fibre so that the direction of the impulse is in the direction of the fibre, then the fibre remains stationary. But if the direction of the sound is at right angles to the fibre, the fibre vibrates with its maximum intensity. Thus, when a sound strikes the fibrils of an insect, those on one antenna are vibrated more powerfully than the fibrils on the other, and the insect naturally

turns in the direction of that antenna which is most strongly shaken. The fibrils on the other antenna are now shaken with more and more intensity, until, having turned his body so that both antennæ vibrate with equal intensity, he has placed the axis of his body in the direction of the sound. Experiments under the microscope show that the mosquito can thus detect to within five degrees the position of the sonorous centre. To render assurance doubly sure, Prof. Mayer, having found two fibrils of the antennæ of a mosquito which vibrated powerfully to two different notes, measured these fibrils very accurately under the microscope. He then constructed some fibrils out of pine wood, which, though two or three feet long and of the thickness of small picture-cord, had exactly the same proportion of length to thickness as the fibrils of the antennæ of the mosquito. He found that these slender pine rods or fibrils had to each other the same ratio of vibration as the fibrils of the mosquito.

CHANGE OF HABIT.—All who have travelled of late years on the St. John's River, in East Florida, must have noticed the cows standing for hours at considerable distances from the shore, thrusting their heads from time to time into the water. This is explained by a change of habit to which they have been driven, during the winter months, by a scarcity of suitable grazing on land. Grazing is never very good there at any time and compels them to feed on moss, young palmetto leaves, shoots of shrubs, etc., which under ordinary circumstances they would reject. The "river grass," which appears to be a species of Valisneria, has become a new and very considerable resource for food. It is said that this plant has established itself, within a few years, in the shoal waters of the lower part of the St. John's where it now covers large submerged tracts, and it is to obtain this that the cows have taken to their semi-aquatic habits. We have frequently watched them and have found that while gathering food, the head was kept beneath the surface for a period varying from fifteen to thirty-five seconds, during which time respiration was of course averted. We have recently seen a colt feeding in a similar manner. The hogs have also taken up this habit, but hold their heads under the water for a shorter time than the cows. The young calves, though they do not eat the "grass," follow the cows and may sometimes be seen with their heads only out of water.—I. J. WYMAN.

Spontaneous Generation. — Mr. E. Ray Lankester, after reviewing in "Nature" the results of recent work done in developing Bacteria, etc. in infusions, concludes that "archebiosis" of "abiogenesis" is "not in any way rendered more probable than it was before by Dr. Bastian's experiments with organic infusions. Prof. Smith and Mr. Archer, of Dublin, eminent authorities in the study of the lower algæ, have criticised in detail and suggested explanations of some of the statements in the third part of 'The Beginnings of Life,' viz., statements relating to the transformation of various species of organisms into each other. They show (the reader may consult Prof. Smith's paper in the October number of the 'Quarterly Journal of Microscopical Science,' 1873), that the asserted 'facts' of transmutation are not facts. It is abundantly demonstrated that the fundamental observations recorded by Dr. Bastian are erroneous, and that he has been mistaken."

Discovery of the Water Thrush's Nest in New England. — Among the trophies taken during a late collecting excursion in the western part of the state of Connecticut are the nest and four eggs of the long-billed water thrush (*Seiurus Ludovicianus*), discovered in June, 1873, at Franklin Station, New London county.

The nest was sunk behind a cushion of moss, and into the rotten wood among the roots of a great tree growing out of the bank (of the Yantic river) in such a manner that it was completely covered over, except just in front, by the roots of the tree. The nest itself was two and one-half inches in internal diameter, and rather shallow. It was rather loosely and carelessly constructed of fine grass and some little dead, fibrous moss: but beneath, a few, and about the outside, particularly in front, many dead leaves were put, as a sort of breastwork to decrease the size of the entrance and more thoroughly conceal the sitting bird. It was underneath the edge of a perpendicular bank eight or ten feet from the water.

The eggs were four in number, and fresh, though the bird was sitting upon them at 2 P. M. Before being blown they were of a beautiful rosy tint: but the ground color is lustrous white, giving the egg a polished look. They are more or less profusely spotted all over with dots and specks, and some obscure zigzagings, of

two tints of reddish brown, with numerous faint points and touches of lilac and very pale underlying red. These marks are much more thickly disposed at the greater end where they form quite large blotches, but there is little indication of a ring. The eggs differ from those of *S. aurocapillus* in being more round and polished, and the spots generally larger and more distinct. One, however, is much paler than the other three. They measure ·80×·60; ·80×·60; ·79×·61, and ·75×·62 of an inch.

The female was shot after giving me a good opportunity to observe her behavior, when she thought herself entirely alone. She kept close to the water, but occasionally flew upon low twigs, alighting in a careful balancing attitude as though it were a great effort to hold on, and keeping up a coquettish flirting of her tail and queer, comical movements of her head. When frightened from the nest she uttered a few distinct chirrups but afterwards kept silent.—ERNEST INGERSOLL, *Cambridge, Mass.*

TWO RARE OWLS FROM ARIZONA.—Charles Bendire, U. S. A., well known as an enthusiastic and energetic ornithologist through his various communications to the NATURALIST, has lately sent me a specimen each of two rare species of owls, from the vicinity of Tucson, Arizona. Of *Syrnium occidentale*, Captain Bendire's specimen is the second ever obtained, the first having been procured by Mr. Xantus at Ft. Tejon, southern California, in 1859. The specimen collected by Captain Bendire is an adult female, collected Nov. 7, 1872. The manuscript notes on the label are as follows:—"Length, 17·25; extent, 42·25; bill, pale yellow; eyes, blue-black."

The specimen of *Micrathene Whitneyi* is the fourth ever obtained, the type being from Ft. Mojave, California, and the other two from Socorro Island, off the western coast of Mexico, in latitude 18° 35′. The latter were collected by the late Col. A. J. Grayson, and the former by Dr. Cooper. Captain Bendire's specimen, which is an adult in fine plumage, was shot April 20, 1872, on the Rillito creek. There are no measurements or other notes accompanying it. Accompanying these specimens is an adult male of *Asturina nitida*, var. *plagiata*, shot on the Rillito creek, May 30, 1872. This specimen possesses peculiar interest from the fact of being the first specimen received at the National Museum from any portion of the United States, though its occurrence within our limits

was previously noted, upon the strength of a specimen observed by me in August, 1871, in Richland Co., Illinois (see AMERICAN NATURALIST, vii, April, 1873). — ROBERT RIDGWAY.

AVIFAUNA OF COLORADO AND WYOMING. — Our genial critic (AMER. NAT., vii, 631) unintentionally misconstrues the sentence of ours which he selects as a point of attack. We said, in illustration of a stricture we passed upon the paper he edited, that "such birds as *Geococcyx Californianus* and *Pipilo mesoleucus* find themselves in ornithological company they never saw outside of a book." Dr. Brewer makes us out to mean by this, that *these two* birds are not found together except on his list, and then proceeds to rebuke our supposed ignorance in a kindly and cogent way. But we lived a long while where these two species occur together, and were perfectly aware of such occurrences; what we meant was, that these were two birds which were placed on the list among *certain other* species with which they were not elsewhere found associated; thereby demonstrating the point of our objection, namely, the incongruity of the Holden-Aiken list as edited by Dr. Brewer. Thus our criticism remains in force, while the point of Dr. Brewer's reply disappears. — ELLIOTT COUES.

THE OLIVE-SIDED FLYCATCHER. — Mr. Merriam (in your Dec. No.) forgets that this bird was first noticed by Mr. John Bethune, at Mt. Auburn, near Cambridge, Mass. The first specimen that Audubon ever saw was shot by him in company with Nuttall, in this town (Brookline) about 1835. A year or two later I found here the nest, with eggs, and have since seen the species from time to time, generally in secluded woods abounding in pitch-pine, like the once lovely but now desolate spot where it was first discovered. — J. E. CABOT.

A REMARKABLE PECULIARITY OF CENTROCERCUS UROPHASIANUS. — A peculiarity of this species, which I have not seen noticed, is that its stomach, instead of being hard and very muscular as in other Gallinacea, is soft and membraneous, like that of the birds of prey. This was first told me by hunters in Nevada, and I afterwards satisfied myself of the truth of their statement that the sage hen "has no gizzard," by dissecting a sufficient number of individuals. This bird is never known to eat grain, but it subsists almost entirely upon green leaves of Artemisia and on grasshoppers. — ROBERT RIDGWAY.

ON A HUMMINGBIRD NEW TO OUR FAUNA, WITH CERTAIN OTHER FACTS ORNITHOLOGICAL. — The following notes were collected during the past season (1873), in connection with the explorations in charge of Lieut. G. M. Wheeler, and under the auspices of the Engineer Department. They are selected as of especial interest, from a large amount of material to be embodied in a future report.

Eugenes fulgens (Sw). Sp. Char.—Male:—Tail rather deeply emarginated. Head above violet purple. Rest of upper parts bronzed green, becoming pure bronze on the tail. Gorget brilliant emerald green, with strong purple reflections. Lower portion of breast and abdomen opaque black, more velvety towards the green of the throat. Sides of body dull green. Wing above and below dull purple. Upper and lower wing coverts green. Crissum pale brownish gray. Bill and feet black.

Female: Tail double-rounded. Above dark metallic green, each feather edged with ash. Below dull white; feathers of throat and fore part of breast with dull grayish green centres. Sides green edged with ash. Wing dull purple. Each feather of the tail except the two central, which are green throughout, with broad purple bands. Three outer tail feathers broadly tipped with dull white which, on the outer, extends slightly further up on the outer web. Length 4·61; wing 2·43; tail 1·75; bill 1·09.

This fine species has, for the first time, been ascertained to inhabit the United States, it never having been observed before farther north than the table-lands of central Mexico. While at Camp Grant, Arizona, Sept. 24th, I procured a fine female, on a small stream issuing from a mountain cañon. When first seen it was being pursued by another hummer, of which I obtained scarcely a glimpse, as they darted past through the trees, but I have little doubt that it was a second of the same species. I think it not unlikely that this species will be found to be not uncommon in summer, in the mountainous districts in southern Arizona and New Mexico. Here along the streams, where the flora is abundant, the multitude and variety of the hummingbirds, resplendent as they are with the most gorgeous colors, cannot fail to strike the most unobservant eye. In the mountains near Apache, Arizona, two of our species (*Selasphorus rufus* and *S. platycerus*) are found in almost incredible numbers, bringing forcibly to mind the accounts of the abundance of the birds of this family, amidst the tropical vegetation of South America; and it will be strange indeed if a careful search in midsummer, in these localities, does not reveal still other species, which must find, in this semi-tropical climate and flora, a congenial home.

BAIRD'S BUNTING (*Centronyx Bairdii* Bd.). The interesting fact of the discovery of Baird's bunting, in large numbers in northern Dakota, by Dr. Coues, was announced in the November NATURALIST. Additional light is thrown upon the range of this

hitherto almost unknown species, by its discovery in southeastern Arizona and southwestern New Mexico. I found it in immense numbers, from Sept. 20th till late in October, throughout the rolling plains along the bases of the mountains, and even quite high up among the foot-hills. It was usually associated with the savanna and yellow-winged sparrows, and seems to embrace in its habits certain characteristics of either species. Its flight is particularly like that of the former bird, but even more wild and irregular. It pursues its zigzag course for a couple of hundred yards, and then, suddenly turning sharply to one side, alights behind some friendly bush, or tuft of grass. Like the yellow-winged sparrow, it is difficult to flush, but seeks rather to evade search by running nimbly through the grass, changing its course frequently, and hiding wherever possible, flying only when hard pressed. A large number of specimens were secured, all moulting, and many in extremely ragged plumage; from their condition it is presumed that they were not migrants, but breed in the immediate locality.

Black-breasted Woodpecker (*Sphyrapicus thyroideus* Bd.). This species was first made known to science through a description by Cassin, published in Dec., 1851, in Pr. A. N. Sc. In 1857, Dr. Newberry published a description of Williamson's woodpecker (*S. Williamsoni*) from specimens obtained by Lieut. Williamson's Expedition: since which time the two species have been accepted by ornithologists as perfectly valid, the true relationship of the two being wholly unsuspected. While in southern Colorado during the past season, I obtained abundant proof of the specific identity of the two birds in question, *Williamsonii* being the male of *thyroideus*. Though led to suspect this, from finding the two birds in suspicious proximity, it was some time before I could procure a pair actually mated. After careful search I discovered a nest excavated in the trunk of a live aspen (*Populus tremuloides*), and both the parent birds were secured as they flew from the hole, having just entered with food for the newly hatched young. As regards the sexual differences of coloration, the case of *thyroideus* is wholly unique. In this species, the colors of the female are radically different from those of the male. With this single exception as far as known, the differences of color between the sexes, in the family of woodpeckers, are confined mainly to the absence, or less amount, of the bright crimson or red patches about the head.

EARED GREBE (*Podiceps auritus* var. *Californicus* Coues). In a series of alkali lakes about thirty miles northwest of Ft. Garland, southern Colorado, I found this species common and breeding. A colony of perhaps a dozen pairs had established themselves in a small pond of about four or five acres in extent. In the middle of this, in a bed of reeds, were found upward of a dozen nests. These, in each case, merely consisted of a slightly hollowed pile of decaying weeds and rushes, four or five inches in diameter, and scarcely raised above the surface of the water, upon which they floated. In a number of instances they were but a few feet distant from the nests of the coot (*Fulica Americana*) which abounded. Every grebe's nest discovered contained three eggs, which in most instances were fresh; but in some nests were considerably advanced. These vary but little in shape, are considerably elongated, one end being slightly more pointed than the other. They vary in length from 1·70 to 1·80 and in breadth from 1·18 to 1·33. The color is a faint yellowish white, usually much stained from contact with the nest. The texture is generally quite smooth, in some roughened by a chalky deposit. The eggs were wholly concealed from view by a pile of weeds and other vegetable material laid across. That they were thus carefully covered, merely for concealment, I cannot think, since in the isolated position in which these nests are usually found, the bird has no enemy against which such precaution would avail. On first approaching the locality the grebes were all congregated at the further end of the pond, and shortly betook themselves through an opening to the neighbouring slough; nor so far as I could ascertain did they again approach the nests during my stay of three days. Is it not then possible that they are more or less dependent for the hatching of their eggs, upon the artificial heat induced by the decaying vegetable substances of which the nests are wholly composed?—H. W. HENSHAW.

OCCURRENCE OF TELEA POLYPHEMUS IN CALIFORNIA.— A CORRECTION. — On p. 454, vol. vii, of this journal, and on p. 15 of the "Proceedings of the Boston Society of Natural History," xvi, I state that *Telea polyphemus*, the American silk worm, does not occur in the Pacific states. It seems that Mr. Henry Edwards, in an interesting paper published in the "Proceedings of the California Academy of Sciences" (received Dec. 11, after my second paper

went to press) records this moth as "apparently not rare in Vancouver island. . . . . This insect, though one of our Pacific coast varieties, has nevertheless a wide range. I have seen specimens from Victoria, northern and middle California, San Diego, cape St. Lucas, and San Blas, Mexico."

On pp. 24 and 40, Bost. Proc., xvi, *Gorytodes uncanaria* Guen. should read *Platœa Californiaria H.-Sch.* and *Gorytodes trilinearia* should read *Platœa trilinearia.* — A. S. Packard, Jr.

Identity of our Hydra with European Species.—At a late meeting of the Academy of Natural Sciences of Philadelphia, Prof. Leidy made some remarks on our native *Hydra*, and described the common green and brown species. He stated that they had been regarded as distinct species from the green and brown ones of Europe, but he could perceive no difference. He described the habits of some of our *Rhizopoda* in eating *Diatomaceæ;* they absorb the chlorophyl and reject the silicious shell. *Amœba* devours *Arcella.*

GEOLOGY.

The Great Lava-flood of the West. — Prof. J. LeConte describes in the March number of the "American Journal of Science," what he regards as the most extraordinary lava-flood in the world. "Commencing in middle California as separate streams, in northern California it becomes a flood flowing over and completely mantling the smaller inequalities, and flowing around the greater inequalities of surface, while in northern Oregon and Washington it becomes an absolutely universal flood, beneath which the whole original face of the country, with its hills and dales, mountains and valleys, lies buried several thousand feet. It covers the greater portion of northern California and northwestern Nevada, nearly the whole of Oregon, Washington and Idaho, and runs far into Montana on the east and British Columbia on the north." Its extent "cannot be less than two hundred thousand to three hundred thousand square miles, *i. e.*, greater than the whole area of France, or nearly double the area of California." He believes the mass of lava to have issued from fissures, some in the Coast Ranges, but mostly in the Cascade and Blue Mountain Ranges. This flood began, probably after the miocene tertiary period and continued

until the post-tertiary. When the fissure eruptions had finally ceased, the work was taken up by volcanoes, a few of which are still active. The paper is one of much interest.

ANTHROPOLOGY.

The Manufacture of Pottery by the Indians. — Among the Indians, the women are the makers of pottery, the men looking upon it as degrading to do "squaw work." Two implements only are used in its construction; one is a wooden paddle (fig. 69), the other a flattened round stone (fig. 70). The figures here given are very much reduced in size. These implements are made by the women with much labor and are considered as valuable and essential household articles. In earlier times when they had nothing but stone tools with which to shape them the labor must have been immense.

Figs. 69 and 70.

After the clay has been properly mixed with water, and kneaded with the hands and the wooden paddle until it is of a proper consistency, a portion is taken and placed over the flat part of the stone and made smooth and even by rapid pats with the paddle. The clay is then placed on a smooth spot on the ground with the stone above it and the bottom of the utensil is thus formed. A piece of clay is now taken in the hands and rolled out to the proper length; it is then placed around the stone in connection with the other piece and the stone is moved about on the inside while with hand and paddle on the outside the roll of clay is flattened out and firmly united with the first piece. More is then added in the same manner and so on until the desired size is attained. The hands are often dipped in water during the operation in order to keep the clay moist; and the stone and hand are used to smooth the inside. The necessary height being attained, the rim is formed by pressing the top layer of the soft clay over the round edge of the stone, the fingers pressing the clay over while the stone is moved round the vessel. If feet or handles are to be applied, they are shaped by the fingers and stuck on; the hand is now freely used to smooth over the newly made vessel. The pot

is then placed in the sun and constantly turned so as to expose it evenly to the heat. When cracks appear, the fingers are dipped into thick mud and applied to them, which process is continued until all the cracks are filled after which the vessel is ready to burn. For this purpose fuel is selected which produces a gentle heat, the excrements of animals being preferred. All the Pueblo Indians of New Mexico and the Moquies of Arizona own many sheep and goats which for safety are put into pens at night, consequently a great thickness of excrement is soon accumulated. This is cut into pieces and dried in the sun for fuel in their dwellings and for burning pottery. For the latter purpose a quantity is set on fire and as soon as sufficiently burnt, some is put inside the vessel while the rest is piled round the sides and the vessel is left in this burning mass to bake, which is done very evenly. If the vessel is to be glazed it is done, after being removed from the fire but while very hot, by rubbing over it very strong salt water and again exposing it to the heat.

The ornamentation is done before burning and immediately after the vessel ceases to crack by exposure to the sun. This generally consists of simple, parallel lines and indentations (the fingers and a stick being the only instruments used to form the required devices). If the vessel is to be colored it is done by dissolving clay of the desired color in water; a brush is formed by chewing the end of a stick, which is then dipped into the coloring matter and applied to form the ornamentation, both lines and figures being made. The vessel is now allowed to dry thoroughly, after which it is burned in the same manner as plain pottery. Sometimes vessels are uniformly colored inside and out; often only the outside is colored, with no other ornamentation. The colors generally used are orange, red, black, slate, white, brown and yellow.

The quality of the clay determines the kind of vessel that is to be made. For a cooking utensil coarse clay is used, often mixed with very fine gravel; this quality stands heat better than the finer clay which is used in making the choicer grades of pottery.

The mode of manufacturing pottery here described is that of the Indians of Arizona, New Mexico, California and Utah at the present day, and when these Indians find a profitable market for their wares they make articles not to be despised by their white friends.

In many ancient burying mounds round stones have been found; these were evidently used in making pottery, the wooden paddles which were probably placed with them having decayed. There is no difference between the modern article and these ancient stones found in the graves associated with pottery and other domestic articles buried with the dead.—EDWARD PALMER.

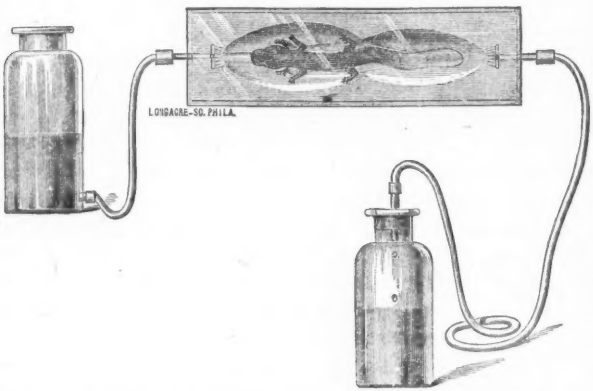
THE BERRIES OF RHAMNUS CROCEUS AS INDIAN FOOD.—This is a fine evergreen, producing numerous red berries which render it very showy. The Apaches collect and pound them up with whatever animal substances may be on hand, the berries imparting to the mixture a bright red color which is absorbed into the circulation and tinges the skin. On one occasion a detachment of the First Arizona Infantry Volunteers attacked a camp of Apaches in the Mogollon Mountains, northern Arizona, killed twenty-two and captured two children; the writer, being with the party as surgeon, examined the dead; their abdomens were much distended from eating greedily of these berries and other coarse substances; while their bodies exhibited a beautiful red net-work, the coloring matter having been taken up by the blood and diffused through the smaller veins. Among the captured stores were quantities of these berries dried, also much finely pounded meat and berries. A stone mortar, near by, plainly told the purpose for which it had been used; while numbers of rats and squirrels with the fur singed off, but otherwise entire, lay ready to form the next batch of mixed meat and berries. These Indians are not dainty, for they relish any part of an animal, even its viscera and blood.—EDWARD PALMER.

MICROSCOPY.

HOLMAN'S SIPHON SLIDE.—Mr. D. S. Holman of Philadelphia, whose life slide has recently become a really useful as well as a popular accessory to the microscope, has contrived a modification of that accessory to be known as the siphon slide, in which living objects of suitable size and habits can be retained under observation uninterruptedly for days or even weeks. A current of water or other fluid, of any required temperature, is made to flow continuously through the chamber containing the object, so that the processes of respiration, circulation, digestion, and nutrition, the phenomena of inflammation, and the effects of some classes of poisons may be studied at leisure and under perfectly natural or entirely controllable conditions. The habits of life of small

aquatic animals are similarly brought within reach of our observations. For the following cut and description of this valuable

Fig. 71.



"This invention presents a modification of the chamber of Mr. Holman's former device, known as the 'Life Slide.' It has fine perforations at each end of the chamber, too small to permit the escape of the animal under view, but sufficient to maintain a flow of water. These openings merge into cylindrical mouths, at each of which is attached a tightly-fitting elastic tube: one of these communicates with the reservoir of water, while the other acts as an escape conduit. The position of the slide, when in use, must be slightly *above* the level of the reservoir, while the escaping tube must rest *below* the reservoir; thus insuring a veritable siphon action in the apparatus, a constant flow of water being thus secured, in connection with the required atmospheric pressure for the retention of the cover of the slide. By this ingenious device, living aquatic animals may be retained in the chamber in a natural condition for hours, and even days."

contrivance we are indebted to the courtesy of the editor of the "Journal of the Franklin Institute."

Structure of the Potato.—Mr. Thomas Taylor explains in a recent article that the vascular bundles in a potato may be easily seen by cutting a potato in two through its axis, the section also passing through some of its eyes, and coating the cut surface first with a solution of bichromate of potash and afterward several times with a strong tincture of iodine which will stain the starch blue but leave the vascular bundles yellow. The air-ducts will then be seen to extend invariably to the eyes.

For microscopical study thin sections are to be made and treated with a strong acid or caustic alkaline solution which will dissolve the starch but leave the vascular bundles unaltered. The sections may then be mounted as usual.

To isolate the vascular bundles place a potato, skinned without wounding the eyes, in a solution of sugar and water (two ounces

to the pint) and keep it at a temperature of 75° F. for nearly two weeks. The fungus of fermentation will reduce the potato to a pulp, except the vascular bundles which may be mounted in gum or balsam and studied with a power of one hundred diameters. They constitute a beautiful object, the pointed forms leading toward the eyes being distinctly seen.

He notices that different varieties of potatoes are affected in a widely different manner by the potato-rot fungus (*Peronospora infestans*), the Jackson White, for instance, being unaffected when the Early Rose growing in the same field were wholly destroyed by fungi. He believes it probable that, other things being equal, those varieties of potatoes which have the smallest air passages will be least affected by the fungus. The Santa Fé potatoes resisted fungoid and infusorial action far better than any other varieties tested, and it is claimed that they also, when growing in the field, resist the "rot" which destroys the varieties commonly cultivated in this country.

Microscopic Drawing. — Wishing to make a neutral tint reflector, and while planning a frame in which to mount it, it occurred to me that a reflector to take the place of the steel disk of Soemmering might be made by mounting a piece of looking-glass in the same way as a neutral tint reflector, but with the silvering removed except a small disk less than the size of the pupil. On trial I found the reflection good, but the thickness of the glass looked through in such an oblique position tinted the field. In order to avoid this I made a mirror with a small disk of tin-foil wet with mercury and placed on the centre of a thin glass cover. This I mounted as before, and found it to work perfectly. This little contrivance which can be made by any one of ordinary mechanical ability will take the place perfectly of the expensive camera lucida.

I made another, using wood in place of brass. I centred a piece of wood and turned a place for the cap end of the ocular and a smaller hole the rest of the distance through the bit of wood; turned the outside in the form of a cylinder and sawed off the end in a mitre-box to an angle of forty-five degrees; then bored a one-half inch hole near the end of the tube for the reflected rays, and turned a disk with a cell for the mirror and fitted the thin glass, keeping it in with a small ring of wood glued over

the edge of the glass. The microscope being arranged for drawing and an object focussed, this tube was adjusted and the oblique end smeared with glue; then the disk was fitted to the end of the tube in such a manner that the bit of mirror was in its optical axis. After the glue was dry the projecting edge of the disk was removed and the eye end of the apparatus cut down so that the eye might approach the reflecting surface. This works nicely, and is much more easily made than the brass mounting.—F. B. KIMBALL, M.D.

AIR-CELLS IN A FLOATING LEAF.—In the leaf of *Limnanthemum lacunosum*, or floating-heart, may be demonstrated multitudes of peculiar stellate bodies, apparently like those found in the stem of *Nuphar*. The whole interior of the leaf is studded with them. There are no ordinary large air-spaces so often found in other floating leaves, but all through the parenchyma these curious bodies are irregularly scattered.

They vary in size and also in the number of rays given off by each. These rays are smooth and not echinulate like those in *Nuphar*. In the field of a $\frac{2}{3}$ lens I have counted hundreds at one view. Under the polarizing binocular microscope properly illuminated, they are revealed with startling distinctness and beauty.

It is nearest the under epidermis that they are located, and the best view therefore is obtained from beneath. Their true physiological significance is not doubtful. In the natural condition they contain air, and the floating-heart rides securely on the surface of the lake, buoyed up by innumerable life-preservers which are not likely to shift out of place.

The veins in the leaf are present, of course, but are comparatively rudimentary. The vascular bundles are faintly marked, and only a few delicate supporting cells line their margins; thus giving another example of nature's economy, for where strongly developed organs are not necessary there we do not find them. — J. G. HUNT, M.D.

LIFE OF HÆMATOZOA. — Francis H. Welch describes in the "Monthly Microscopical Journal" a thread-worm (*Filaria immitis*), infesting the vascular system of the dog, and thus theorizes as to the method by which such parasites, which are now doubly interesting from having been recently discovered in human blood, may effect an entrance into the system. "The faculty of

migration of the white corpuscles of the blood through the tissues of the body has been demonstrated; the diameter of the body of the young filaria is considerably below that of the corpuscle; hence with the brisk, wriggling movements of life, the possibility of their passage through a mucous membrane, especially through the soft granulations of an ulcer, is quite within the bounds of reality. Based upon the facts we know, we may in imagination follow them from a mucous tract (*e. g.* the intestine) to a lacteal or blood vessel; they follow the course of the circulation, growing on the pabulum of the blood of the host, and easily passing with the corpuscles through the capillaries; soon their size unfits them to traverse every viscus, and the minute capillaries of the lungs act as a sieve to retain them in the venous circulation; they copulate and the females become fecund; a young brood arises to continue the race, provided accidental causes, such as mechanical blocking up of important blood-vessels by the parent worm, do not determine the death of the host. By this hypothesis the ingress of individuals capable of arriving at maturity is explained, while the countless hordes of young are rendered lucid only by the presence of one or more parent worms within the vascular walls. These parent worms after producing their progeny may possibly die and disintegrate, and so account for their absence, or non-discovery, in hosts teeming with the young brood." The presence of the parent worm is attributed suggestively to the ingestion of water or under-cooked flesh containing them.

Finding the Chemical Focus in Photomicrography.—Prof. H. A. Rowland has suggested, at the Troy Scientific Association, the simple expedient of laying a broad flat object, as for instance a microphotograph or a large transparent section, obliquely upon the stage, so that one edge shall be considerably higher than the other. The objective is then carefully focussed for some one well-marked portion of the object, and a photograph taken which will of course show the best definition at some other portion. The instrument is next focussed for the point in the object which in the photograph is best defined, and the distance apart of these two planes, measured by the fine adjustment wheel, being the distance of the chemical from the visual focus, is a correction which may always be employed in photographing with the same objective, the lens being focussed as usual by sight and then turned out of focus

the required distance. This method is applicable to the lower powers, and is for them far preferable to the usual procedure of guessing at the amount of correction required and taking a series of photographs to determine which is the most successful correction.

A SPHERICAL DIAPHRAGM.—Wishing to use tubular diaphragms with my microscope, and knowing how clumsy the ordinary ones are, I set to work, and endeavored to devise a substitute. I made a globe one and one-fourth inches in diameter and drilled holes through it of the proper grade of sizes, and adjusted it so that by a spring stop the holes will correspond to the axis of the microscope when the ball is revolved on its axis by a milled head at the right of the stage. The fittings are so arranged that the diaphragm may approach or recede from the stage so as to touch the slide or be far from it. The globe may be made hollow and the lower part cut off if the tubular wells are not desired. I think this form of diaphragm offers many advantages over the ordinary piece of apparatus.—F. B. KIMBALL.

LEAF SECTIONS.—Mr. Charles Stewart obtains sections of fresh leaves by inserting a piece of the leaf in a notch cut in a carrot and cutting slices through both carrot and leaf. The sections are then soaked in water in a watch-glass under an exhausted receiver, stained with hæmatoxylin, and transferred through water, absolute alcohol and oil of cloves to the mounting medium. In the oil of cloves they would curl up were they not prevented by a heavy cover glass laid upon them.

ANOTHER ERECTOR.—John A. Perry, of Liverpool, recommends an objective, inverted, above the eye-piece as an erector. With a 1 inch working objective and A ocular, a $\frac{1}{2}$ or $\frac{1}{4}$ objective may be inverted and stood upon the cap of the ocular, giving an increase of power and of working distance as well as an erect image. [A $\frac{1}{2}$ objective supported on an adapter two inches long seems to perform as well as any; but the inconveniences of the method seem to be too great for its advantages.]

CEMENTS.—Mr. F. Kitton prefers, for making varnish cells, asphalte with the addition of a small quantity of gold size; the cells when finished being dried over night in a cool oven. For mixing colors with, he prefers dammar cement with a few drops of

gold size; the exterior ring being of vermilion or purple lake, and the interior ring white zinc in preference to white lead. Sealing wax varnish he does not trust.

Auto-microscopy.—Dr. Otto Obermier, who died of cholera at Berlin a few months since at the age of thirty-one, deserves to be remembered as the first microscopist, probably, who continued his studies in pathology by the study of his own blood during the progress of the disease of which he died; the disease having been contracted, also, by imprudent devotion to its investigation.

Measuring the growth-rate of Plants.—E. Askenasy measures with a micrometer the advance of the growing point of a root or branch in a glass tube in the field of the microscope. The stem is fixed by cork or other means at one end of the tube, and the conditions of light, temperature and moisture are easily regulated.

A Revolving Amplifier.—Mr. John Emery exhibited, at the Royal Microscopical Society, a series of amplifiers, plano-concave lenses of different foci, arranged in a metallic disk which revolves so as to bring any desired lens within the body of the microscope.

Quieting Frogs.—At the Medical Microscopical Society, Dr. Bruce stated that a frog might be quieted, for experiment on the circulation, etc., by holding for a few minutes in the hand, as well as by the usual plan of immersing in warm water.

NOTES.

Lt. G. W. Wheeler's Expedition, for the Survey of the Territories west of the 100th meridian, has lately returned to Washington to elaborate the results of the last season's work in the field. A very extensive ground in Colorado, Utah, New Mexico and Arizona was thoroughly gone over, and large collections were made by the naturalists of the expedition in all departments of zoology, as well as in botany and geology. The suite of birds is particularly large and valuable, embracing many rarities and desiderata. Too much credit cannot be given to Mr. H. W. Henshaw for his indefatigable exertions in this department. His skins are in admirable preservation, and form one of the most valuable lots ever brought from the West. The birds and mammals will be elaborated by Mr. Henshaw, in connection with Dr. H. C. Yarrow, a

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well-known and accomplished naturalist. The collection of reptiles, fishes and insects is large; these objects will severally be placed in the hands of the most competent specialists for elaboration. Among the *Orthoptera*, it may be observed, many of Haldemann's little known or lost species are recovered. There is a valuable collection of crania, implements and other ethnological material. The field work in Natural History of 1873 was accomplished by Mr. Henshaw, with Dr. Rothrock, the talented young botanist, Dr. Newberry, Jr., and Dr. Loew. Next season, the same department will be placed entirely in the charge of Dr. Yarrow, who will be assisted by Dr. Rothrock, Mr. Henshaw and others. We shall look for still more interesting results under this excellent arrangement. We learn that seven volumes showing the progress of the work thus far, and beautifully illustrated, are now being arranged for the printer. Every naturalist will join us in hoping that the good work may be successfully prosecuted, and in trusting that the appropriations necessary to this end may be made by Congress.

The annual social meeting of the Troy Scientific Association was held Jan. 19th, at the residence of Dr. Ward, on Fourth street. Notwithstanding the inclemency of the weather the attendance was good, nearly one hundred being present, and half of that number ladies. Among the gentlemen present were noticed Rev. Dr. Robinson, Rev. Dr. Irvin, Rev. Mr. Hervey, Rev. Mr. Young, and many other leading citizens. After a talk of about two hours, the election of officers for the ensuing year was proceeded with. Prof. Beattie read the report of the committee on nominations, which recommended the election of the following gentlemen: President, Dr. R. H. Ward; First Vice President, Rev. A. B. Hervey; second do., Rev. Wm. Irvin; Corresponding Secretary, F. H. Stevens; Recording Secretary, Prof. A. E. Bower; Treasurer, Prof. David Beattie. On motion the report was accepted and the parties above named duly elected. The following persons were elected members of the Association; resident members, Francis O. Dorr, of Troy, and Albert E. Powers, of Lansingburg; corresponding member, John Jones, of Rensselaerville, N. Y. After the election and other formal business had been transacted the company repaired to the dining room, and were hospitably entertained.

The Rev. John Bachman of Charleston, S. C., died on Feb. 25th, at the venerable age of 85. This eminent naturalist and theologian was a native of New York, having been born in Dutchess county, Feb. 4, 1790. He joined the ministry of the Lutheran Church in 1813, and in 1815 became pastor of the German Church of that denomination in Charleston, S. C., retaining that office until his death. He was an associate of Audubon, whom he assisted in the preparation of his great work on Ornithology, and was the principal author of the three volumes on the quadrupeds of North America, illustrated by that great naturalist and his sons. Bachman also published other works and about fifteen minor papers, all evincing unusual powers of observation, especially those on change of color in birds, on the migration of birds, on the mode of reproduction of the opossum, and several anthropological papers.

The Legislature of Kentucky have appropriated $18,500, annually, for two years, for a new geological survey of the state. Prof. N. S. Shaler is appointed state geologist.

Is not the time coming for a careful geological and zoological survey of the state of Massachusetts? While surveys are going on or have recently been completed in so many other states, it is not particularly to the credit of this state that a thorough survey of its geological and biological riches has not been instituted. It is now over thirty years since the original incomplete survey of the state was made. Since then physical science has changed so much that the work done then needs to be reviewed and greatly extended.

The enterprising city of Waterbury is to be congratulated on the possession of a score or more of gentlemen, associated as the Waterbury Scientific Society, who have been endeavoring for several years, by popular lectures and other means, to attract the more intelligent of their fellow-citizens to the improvement and development of their minds by the beginnings of scientific research. It is not often that any except a college town has so many men who are earnest students in special fields of knowledge, and who have made so much attainment in their specialties. — *Hartford Courant.*

A Microscopical Society has been formed at Louisville, Kentucky, which meets the first and third Thursdays of each month.

The following are the names of the officers for the ensuing year: President, J. Lawrence Smith; Vice Presidents, Noble Butler, Chas. F. Carpenter; Treasurer, C. T. F. Allen; Cor. Sec'y, E. S. Crosier; Secretary, John Williamson; Executive Committee, Thos. E. Jenkins, James Knapp, W. T. Beach, E. R. Palmer, R. C. Gwathmey.

THE Maryland Academy of Sciences have recently built a new hall for a museum 30×70 feet, by 20 feet high. It is proposed to arrange in it a biological collection of the objects chiefly representative of the regions of which Maryland forms a part.

EXCHANGES.

Slides of Diatoms arranged in groups, offered for other mounted microscopic specimens.—W. W. RINER, Greene, Butler Co., Iowa.

W. M. WILSON would like to correspond with two or three young botanists for the purpose of exchanging Rocky Mountain specimens for eastern species of plants.

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Elements of Zoology. By M. Harbison. 12mo, pp. 172. G. P. Putnam's Sons, Publishers. New York, 1874.

Notes upon the Fossil Remains of the Lower Carboniferous Limestone Exposed at Grand Rapids, Mich. By E. A. Strong. 8vo, pp. 6. No. 3 of Miscellaneous Papers of the Kent Scientific Institute.

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